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STRATEGIC OBJECTIVE CLOSE OUT REPORT

UNITED STATES - ASIA ENVIRONMENTAL PARTNERSHIP

December 2005

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US-ASIA ENVIRONMENTAL PARTNERSHIP, USAID/RDM/A

STRATEGIC OBJECTIVE CLOSE OUT REPORT

SO NAME:	Sustained impact on the key people, institutions, and forces that drive the movement to a clean revolution in Asia.	
SO NUMBER:	498-009	
SO PERIOD:	FY 2001 – FY 2005	
GEOGRAPHIC AREA:	**Primary implementation countries:** India, Indonesia, Philippines, Sri Lanka, Thailand, and Vietnam	
	Secondary participation: Hong Kong, Malaysia, Singapore, South Korea, and Taiwan	
TOTAL COST:	USAID DA	$50,200,000
	Counterpart contributions	$28,229,855
	Partner resource contributions	$5,689,403
	TOTAL	$84,119,258

I. BACKGROUND

Over the past two decades, Asia has experienced some of the most dramatic economic growth in the world, significantly reducing poverty levels in many countries. However, the combination of rapid economic growth, industrialization, and urbanization has also contributed to deteriorating environmental conditions, as well as negative health and economic impacts throughout the region. Air and water pollution are particular challenges, as are generation of solid and hazardous wastes. In addition, ineffective institutions, inadequate regulatory frameworks, and inefficient compliance contribute to the region's environmental problems.

The US-Asia Environmental Partnership (US-AEP) was launched on President George H.W. Bush's initiative in January 1992 to help alleviate the adverse environmental impacts of urban and industrial expansion in Asia. Led by USAID as a public-private program, US-AEP worked through direct peer-to-peer partnering to develop and implement practical solutions to environmental challenges, bringing experts and practitioners together to share knowledge and to act directly and

in concert to solve problems. Many activities created private-private and private-public partnerships and linkages that endure beyond the end of the program in fiscal year 2005.

Throughout its 12-year existence, US-AEP retained "partnerships" as its salient feature, but transitioned through three phases of program focus: (1) an early emphasis on trade promotion activities with the U.S. Department of Commerce (DOC) as a key partner; (2) a narrowed focus on greening of Asian businesses; and finally (3) the ambitious goal of encouraging a "clean revolution" in Asia with a heightened focus on improved environmental governance and intra-regional cooperation. This close out report covers the Strategic Objective (SO) that guided US-AEP implementation in this final phase, from FY 2001 to FY 2005.

US-AEP experienced significant program and management changes during its final five years, namely: (1) the withdrawal of DOC involvement in 2002; (2) a reduction in the number of countries covered by the program, from 11 in early 2001 to six primary implementation countries; and (3) a shift in management in 2003 from USAID/W to the Regional Development Mission/Asia (RDM/A) in Bangkok.

II. PRINCIPAL IMPLEMENTING PARTNERS

US-AEP worked with numerous implementing partners throughout its 12-year history. During the period covered by this SO Close Out Report, US-AEP had an interagency agreement (IAA) with the U.S. Environmental Protection Agency (USEPA) and accessed an EGAT/ENV IAA with the National Oceanic and Atmospheric Administration. Major contractors/cooperators were the Institute for International Education, the Louis Berger Group, PADCO, the National Association of State Development Agencies (NASDA), the Alliance to Save Energy, and the International City Managers Association (ICMA). US-AEP had cost-sharing arrangements with the Council of State Governments, Global Technology Network (GTN) and Environmental Technology Network for Asia (ETNA), and The Asia Foundation, as well as long-term partnerships with a number of non-governmental organizations (NGOs) and professional associations in Asia and the U.S.

III. OVERALL IMPACT SUMMARY

US-AEP made significant and often critical contributions to improving environmental conditions in the six countries in which US-AEP primarily operated (India, Indonesia, Philippines, Sri Lanka, Thailand, and Vietnam) from FY 2001–FY 2005.[1] Through promotion of U.S.-Asian and Asian-Asian partnerships, development and support of regional institutions, provision of technical assistance, international study exchanges, targeted small grants, leveraging of private sector expertise and resources, and cooperation with other donors, US-AEP support resulted in better

[1] While five Advanced Developing Countries (ADCs) also received US-AEP assistance in FY 2001 (Hong Kong, Malaysia, Singapore, South Korea and Taiwan), they were not a primary focus of the program over the past five years, and because the activities with these countries were primarily related to support for trade in environmental technologies, impacts in these countries will be summarized only under IR 1.4 below.

air quality, cleaner water, stricter regulations and improved enforcement of laws, and enhanced capacity of Asian institutions to improve environmental conditions.

A review of impacts over the past five years illustrates that US-AEP activities had a particular impact on preventing pollution, especially through better air quality management and solid and hazardous waste management practices; improving water supplies and protecting drinking water sources from further degradation; strengthening regulations and improving implementation of environmental programs in the region; and increasing public awareness of environmental issues and fostering greater public participation in environmental decision-making.

This section contains highlights of program performance as measured by its performance indicators and qualitative impacts linked to the final US-AEP SO and the four associated Immediate Results (IRs) during FY 2001 - FY 2005. A full summary of performance indicator data is presented in the table that follows the narrative summary.

STRATEGIC OBJECTIVE LEVEL IMPACTS

SO: SUSTAINED IMPACT ON THE KEY PEOPLE, INSTITUTIONS, AND FORCES THAT DRIVE THE MOVEMENT TO A CLEAN REVOLUTION IN ASIA.

SO level impacts focus on key program elements – partnerships and exchanges – that formed the backbone of the US-AEP program. Key metrics used to measure US-AEP success in achieving the SO were the number of individuals and institutions engaged in partnership and capacity building activities. By FY 2005, a total of 141 partnerships were formed, an almost 20 percent increase over the number that existed in FY 2001. Initially, most institutional participants were U.S. organizations but as the program progressed, the number of Asian institutions increased dramatically. From 2001 to 2005, participation by U.S. institutions decreased from 222 to 206 while participation by Asian institutions rose from 186 to 2,107. Likewise, there was a dramatic increase in the number of individuals from Asia that annually participated in US-AEP supported exchanges, from 425 in FY 2001 to 7,698 in FY 2005.

These partnerships and exchanges greatly expanded knowledge and environmental management skills among key environmental champions/leaders in the region and strengthened key local, national, and regional institutions. These interactions also improved national, intra-regional, and international linkages that will help sustain program impacts, in some cases spawning institutional homes for future cooperation. For example, US-AEP played a key role in establishing the Solid Waste Management Association of the Philippines (SWAPP) and the Southeast Asia Water Utilities Network (SEAWUN). These and other US-AEP supported institutional development efforts at the national and regional level will sustain movement toward a "clean revolution" in Asia for years to come.

INTERMEDIATE RESULT LEVEL IMPACTS

Activities related to US-AEP's IRs contributed substantially to progress in achieving the program's SO. The partnerships and exchanges highlighted in the SO indicators and discussed above, however, reveal only part of the overall impact of the US-AEP program. Significant US-AEP impacts are also revealed by examining the details of IR-targeted activities, in which partnerships and exchanges played a central, though not exclusive, role. A discussion of these impacts is provided below.

IR 1: IMPROVED PUBLIC POLICY AND ENVIRONMENTAL REGULATIONS

The impact on regional governments and civil society of US-AEP activities supporting improved public policy and environmental regulations have laid the groundwork for continuing progress in addressing environmental challenges in the region. Specifically, US-AEP activities have:

- Strengthened laws and regulations, providing regional government officials with stronger frameworks for environmental compliance;
- Strengthened government institutions, improving their ability to implement and enforce environmental programs and regulations;
- Increased the capability of government officers to address environmental problems, increasing their capacity to meet future challenges;
- Institutionalized public participation in meeting environmental challenges, ensuring that citizens have a voice in environmental decision making; and
- Promoted greater engagement of civil society in environmental issues, raising public awareness of environmental problems that can translate into public pressure on governments to act.

The remainder of this section provides a summary of US-AEP performance indicator data and examples of US-AEP activities that serve to illustrate the impacts that the US-AEP program has had in this area.

IR performance indicator data show that US-AEP made substantive progress in supporting the development of formal Asian government systems that monitor environmental quality. Six such systems were established with US-AEP support as of FY 2001; by the end of the program, 14 such systems had been established. These monitoring systems provide important benchmarks of existing environmental conditions and will be used into the future to judge the impact of ongoing improvements in regulation and enforcement.

Further examples of US-AEP impacts under this IR include the following:

- To improve the ability of Asian legal, regulatory and judicial systems to protect the environment, US-AEP catalyzed more than a dozen major legal and policy advances to **strengthen environmental regulatory and enforcement frameworks.** These included support for the 2005 Philippines Clean Water Act, which incorporates international best practices and use of public consultation in developing implementing rules and regulations; the Ecological Solid Waste Management Act and the Clean Air Act in the Philippines; the

ground-breaking Public Consultation Law in Thailand, which directly engages the public in environmental decisions; and new Thai regulations helping producers of clean, renewable energy to sell excess power on the national grid. US-AEP compliance and enforcement work in India helped to introduce the ideas of civil administrative authority and self-monitoring into the National Environment Policy drafted in 2004. US-AEP also strengthened the capacity of regional trial courts in the Philippines to hear environmental cases; supported the enactment of a "green bench" in Thailand to hear environmental cases; and at the regional level, sponsored the establishment of the Asian Environmental Compliance and Enforcement Network (AECEN), a network of eight countries catalyzing new law enforcement polices and practices in the region.

- US-AEP also helped **institutionalize public participation, promote decentralization, and encourage increased engagement of civil society** in meeting environmental challenges. Examples include ICMA CityLinks program support for the adoption of public participation processes among three Thai cities that are helping to sustain and improve provision of sanitation services; introduction of the community-based environmental management (CBEM) approach among stakeholders surrounding a polluted canal in Ho Chi Minh City, Vietnam, Thailand's Thachin River basin, and Lake Laguna in the Philippines; and support to initiate the Community Led Environmental Awareness Network (CLEAN) in Sri Lanka, which has increased public awareness and involved citizens (particularly school children) in monitoring air and water quality. Support for institutionalizing of India's Advanced Locality Management System in Western India has helped to strengthen 24 community waste management organization in and around Mumbai City.

- US-AEP **strengthened and built capacity among key individuals and institutions** working to develop, implement, and enforce improved policies and regulations. Examples include: linking international counterparts with local environmental champions like Mayor Mary Jane Ortega of the Filipino city of San Fernando, who helped found SWAPP; inspiring environmental managers like Mrs. Le Thi Ngoc Quynh of Electricity of Vietnam, who developed the national power company's first code of management practices for hazardous waste after learning about similar plans at Holcim Cement and Nuccor Steel during a U.S. study tour; and providing support for grassroots organizations like the Joint Committee for Leaded Gasoline Phase out (KPBB), a coalition of Indonesian NGOs advocating for cleaner air that contributed to the phase-out of leaded gasoline in 40 percent of the country.

IR 2: IMPROVED URBAN ENVIRONMENTAL MANAGEMENT

US-AEP activities promoted improved urban environmental management, resulting in impacts that will ensure better provision of environmental services beyond the end of the US-AEP program. Specifically, US-AEP activities have:

- Improved the capacity of municipal water supply and solid waste management service providers, improving water supply and reducing pollution caused by unmanaged waste;
- Increased the capacity of local government officials to meet urban environmental challenges and civil society to participate in such efforts; and

- Contributed significantly to local efforts to improve urban air quality, particularly in the area of vehicle emissions.

The remainder of this section provides a summary of US-AEP performance indicator data and examples of US-AEP activities that serve to illustrate the impacts that the US-AEP program has had in this area.

Performance indicator data highlight significant accomplishments in the area of urban environmental management including: an increase in the number of new or strengthened NGOs, associations, and networks organized around urban environmental issues, from 34 in FY 2001 to 103 by FY 2005; and an increase in the number of strengthened NGOs, associations and networks organized around urban environmental issues over the life of the SO, from 2 to 27.

Examples of specific impacts under this IR include the following:

- US-AEP activities helped **improve delivery of municipal environmental services.** In cooperation with the Alliance to Save Energy, US-AEP supported "Watergy™" programs in several countries, an approach to improve water supply services through increasing energy efficiency within utilities. In many cases, increased energy efficiency and the resulting cost savings freed up resources for needed investments (including expansion of water supply and sanitation services) and other municipal services. In Pune, India, for example, a Watergy™ effort helped the municipality save more than 300,000 kWh of electricity annually, equivalent to a savings of 1.5 million rupees (US $15,000). In addition, the US-AEP-supported Certification and Training for Network Improvement Project (CATNIP) in Indonesia helped three water utilities create and maintain "drinking zones," providing drinking quality water to approximately 2,300 households. In Thailand, the CityLinks program leveraged experience from the City of Portland to help the city of Khon Kaen broker a landmark agreement to collect tariffs from large wastewater producers, such as hotels and shopping complexes, to sustain their wastewater treatment system. At the regional level, US-AEP worked with SEAWUN to increase networking among water utility managers across the region, promote improved performance through benchmarking, and provide technical assistance for improved service and full cost recovery. US-AEP was also a regional leader in providing technical assistance for improved solid waste management. In India, over the past two years, 37 cities have developed and are now implementing master plans for solid waste management due to US-AEP support. In Ho Chi Minh City, Vietnam, US-AEP helped boost the efficiency of solid waste management and improve the working conditions of informal waste collectors. In Sri Lanka, US-AEP helped the city of Colombo solve a mounting solid waste problem through improved composting, reducing the amount of waste disposed of at city landfills by more than 80 percent. Finally, US-AEP's city partnering program, Resource Cities, linked three Asian cities with U.S. counterparts to develop environmentally sound city management plans. For example, the program helped the City of Cebu, Philippines design a 10-year comprehensive solid waste management plan to reduce the volume of waste entering its landfill.

- To build **urban environmental management capacity**, US-AEP strengthened new and existing local government associations in India, Thailand, and the Philippines. With increasing government decentralization, municipalities need to improve their level of professional

management and ability to create and disseminate new ideas, best practices, and performance benchmarks. US-AEP supported associations in India with a combined membership base of over 1,000 local municipal bodies, including new associations in the States of Andhra Pradesh, Gujarat, Karnataka, Maharashtra, and Tamil Nadu. US-AEP also built the environmental management capacity of key local leaders and environmental champions. US-AEP co-founded the Mayors Asia Pacific Environmental Summit (MAPES), a unique forum for Asian urban leaders to commit to action to improve their cities, exchange lessons, and build relationships. US-AEP sponsored and helped organize three MAPES (FY 1999, 2001 and 2003).

- Among US-AEP urban environment impacts, there were particularly notable contributions made to **improving urban air quality**. US-AEP was a key supporter of improved air quality management practices including: successful efforts to phase out leaded gasoline in the Philippines, Sri Lanka, Vietnam and much of Indonesia; stricter standards for motor vehicles and fuels, leading to the adoption of new standards in Vietnam, the Philippines, and Thailand; implementation of the Developing Integrated Emission Strategies for Existing Land Transport (DIESEL) program in Bangkok to reduce bus fleet emissions; development of a science-based, urban air quality management model, parts of which are now being replicated in cities across India; and initiation of the remarkably effective Clean Air Program (CAP) in Puerta Princesa, Philippines, where emissions reductions in three-wheeled taxis resulted in reductions in hydrocarbon and CO_2 emissions of 40 and 30 percent, respectively. The CAP model is now being disseminated throughout the country and is already being replicated in several other Filipino cities.

IR 3: IMPROVED INDUSTRIAL ENVIRONMENTAL MANAGEMENT

Sustained impact on individuals and organizations in the area of industrial environmental management was achieved by US-AEP activities that:

- Supported development and implementation of voluntary industrial environmental programs to reduce dependence on governmental "command and control" approaches to environmental compliance;
- Promoted implementation of environmental management systems that focus on continuous improvement in environmental performance; and
- Encouraged internal environmental monitoring and reporting by industry in the region to promote corporate accountability for environmental impacts.

The remainder of this section provides a summary of US-AEP performance indicator data and examples of US-AEP activities that serve to illustrate the impacts that the US-AEP program has had in this area.

Performance indicator data for this IR show that the number of US-AEP supported corporate programs established to provide transparent environmental performance reporting and disclosure increased from 2 to 8 between FY 2004 and FY 2005, and the number of US-AEP-supported networks and associations established and/or strengthened to promote environmental management systems and cleaner industrial production increased from 16 in FY 2001 to 48 by FY 2005.

Specific impacts under this IR include the following:

- US-AEP support resulted in the development and implementation of some of **the first voluntary industrial environmental management programs** in the region – a revolutionary accomplishment for Asia**.** In Thailand, the Philippines, and Vietnam, US-AEP was the key catalyst for the establishment of Responsible Care, a global voluntary environment and safety program in the chemical industry. In the Philippines, US-AEP support for Greening the Supply Chain (GSC) programs resulted in major companies, such as Nestlé, mandating specific levels of environmental performance from their manufacturing partners and vendors. GSC is now institutionalized among Nestlé's suppliers.

- US-AEP programs were critical to **promoting implementation of environmental management systems.** Through US-AEP supported collaboration with the New York City Transit Authority, Delhi Metro Rail Corporation became the first metro in the world to be ISO 14001 certified in December 2002. US-AEP also provided critical support for the Philippines Environmental Partnership Program (PEPP), which sets standards for voluntary implementation of environmental management systems and offers incentives for their use. In Vietnam, US-AEP worked with the national Electricity of Vietnam Corporation and U.S. power companies to develop a hazardous waste management plan for oil from used transformers contaminated with polychlorinated biphenyls (PCBs).

- US-AEP programs also encouraged **internal environmental monitoring and reporting** by industry in the region. US-AEP helped introduce the Global Reporting Initiative to the region, a program to encourage and standardize reporting on environmental performance. US-AEP also worked in the tourism sector in Sri Lanka to improve efficiency of energy use through better monitoring and development of systems to benchmark energy savings.

IR 4: INCREASED TRANSFER OF U.S. ENVIRONMENTAL TECHNOLOGY, EXPERTISE, AND PRACTICES TO ASIA THROUGH TRADE AND INVESTMENT

Impacts under this IR became less critical to the program after formal involvement of DOC in US-AEP completely ended in September 2002. However, US-AEP efforts did continue to contribute to the **introduction of a wide range of U.S. environmental technologies** to the region. For example, US-AEP facilitated the purchase of emissions monitoring equipment from ESP, Inc. in India, Sri Lanka, and Vietnam; biogas energy generation equipment from Capstone Services in India; air emissions control systems from Beltran in India; hazardous waste treatment equipment in several cities in India, and municipal water system equipment from Ford Meter Box Co. in the Philippines. In FY 2001 – the final year of large scale DOC involvement with the program – the value of US-AEP assisted sales and services was an estimated $109.5 million.

Table 1: US-AEP Performance Indicator Table: FY 2001-2005

The table below provides a full summary of performance indicator progress by SO and the four IRs during the period FY 2001 to FY 2005. These figures provide further support for the impacts described above.

Performance Indicator	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
Strategic Objective: Sustained impact on the key people, institutions, and forces that drive the movement to a clean revolution in Asia.					
1a: The number of new, continuing and self-sustaining U.S.-Asian partnerships.	304	117	106	144	141
1b: The number of U.S. and Asian institutions participating in US-AEP supported knowledge transfer activities.	US: 621 Asia: 1,346 Total: 1,967	US: 335 Asia: 587 Total: 922	US: 263 Asia: 1,289 Total: 1,552	US: 206 Asia: 1,480 Total: 1,686	US: 245 Asia: 2,107 Total: 2,352
1c: The number of individuals from Asia participating in US-AEP supported knowledge transfer activities.	671	612	2,506	4,289	7,698
1d: The percentage of total resources (used to support US-AEP activities) that are leveraged from non-USAID resources.	40%	34%	25%	48%	48%
IR 1.1 Improved public policy and environmental regulations.					
1.1a: Number of environmental policies, laws and regulations strengthened through US-AEP activities.	35	13	29	28	64
1.1b: Number of formal systems set up by Asian government units to capture environmental data.	4	2	9	13	14
IR 1.2: Improved Urban Environmental Management					
1.2a: The number of LGUs and public agencies implementing new or improved urban environmental management practices, policies and infrastructure programs.	194	27	89	90	119
1.2.1a: Number of new or strengthened NGOs, associations, and networks organized around urban environmental issues.	62	43	33	109	103

Performance Indicator	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
1.2.2a: Number of new or improved urban environmental management practices and policies implemented by local government units and public agencies.	194	28	48	36	87
1.2.3a: Number of local projects implemented that result in the addition or improvement of environmental infrastructure or equipment.	37	5	30	14	27
IR 1.3: Improved industrial environmental performance					
1.3.1a: Number of US-AEP supported corporate programs established for transparent reporting and disclosure.	1	0	1	2	8
1.3.2a: The number of US-AEP-supported networks and associations established and/or strengthened to promote environmental management systems and cleaner industrial production.	20	29	38	33	48
1.3.3.a: Number of US-AEP assisted Asian institutions involved in international industrial-environmental dialogues.	2	2	8	13	13
IR 1.4: Increased transfer of U.S. environmental technology, expertise, and practices to Asia through trade and investment.					
1.4a: The dollar value of US-AEP-assisted sales of U.S. environmental equipment and services.	$109.5 million	$4.9 million	Not Reported	Not Reported	Not Reported
1.4e: Number of Asians who participated in U.S. technology trade shows.[2]	297	187	107	101	48

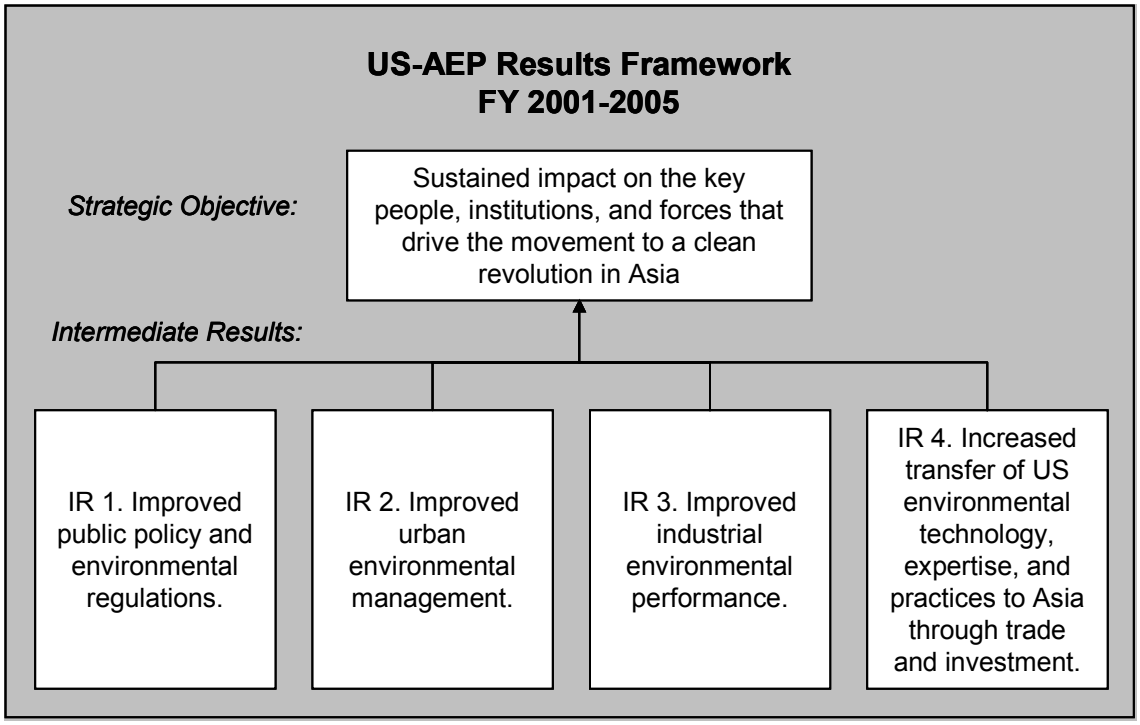
[2] Once DOC withdrew from US-AEP, this indicator was no longer of significant value. However, the number of sponsored trade show participants did continue to be tracked by some countries, in particular India and Sri Lanka. Throughout the entirety of the SO period covered in this report, India continued to use technology transfer as one of its core program strategies.

IV. SIGNIFICANT CHANGES TO THE RESULTS FRAMEWORK

The US-AEP Results Framework, as presented below, was developed in FY 2001 and remained unchanged through FY 2005. Although the Results Framework did not change, there were several changes to the US-AEP program that had a significant impact on its emphasis and management. The most significant changes were the withdrawal of DOC and the shift to a field-based planning and management system.

DEPARTMENT OF COMMERCE WITHDRAWAL FROM US-AEP

DOC's withdrawal from the US-AEP program came in two phases: a withdrawal from Advanced Developing Countries (ADCs) at the end of FY 2001 and a complete withdrawal from US-AEP at the end of FY 2002. Through FY 2001, US-AEP operated in the following ADCs: Hong Kong, Malaysia, South Korea, Taiwan, and Singapore. Since US-AEP operated its program in the ADCs using DOC offices, the withdrawal of DOC from the program effectively ended US-AEP's involvement in those countries. The following year, in FY 2002, DOC withdrew from US-AEP altogether.



Throughout the period of the DOC's involvement (1992-2002), a significant programmatic emphasis was placed on IR 4 – increasing the transfer of U.S. environmental technology, expertise, and practices through trade and investment. This agenda was driven in large measure by the influence and involvement of DOC, whose overseas mandate is the promotion of U.S. trade and investment. In addition, several of US-AEP's more prominent partners during this period focused

on trade promotion, including the National Association of State Development Agencies and the Council of State Governments.

In operational and management terms, DOC's withdrawal meant that US-AEP substantially reduced its emphasis on trade promotion as a means to achieve its strategic objective, and the program also stopped collecting data on the dollar value of US-AEP-assisted sales of U.S. environmental equipment and services (the performance measure for IR 4). The last year this data was collected was FY 2002, a year in which $4.9 million in environmental sales were recorded. The previous year, in FY 2001, the level of environmental sales had been $109.5 million. The large value of environmental sales recorded in FY 2001 came at a time when the ADCs were still included in the program. Representing the program's wealthier countries, the ADCs historically accounted for a majority of environmental technology sales.

The withdrawal of DOC from the program marked the beginning of a clear shift in US-AEP focus to align it with USAID priorities. This resulted in a reduced emphasis on technology sales and greater emphasis on development outcomes from program activities.

THE SHIFT TO A FIELD-BASED PLANNING AND MANAGEMENT SYSTEM

The other significant change that took place during the SO was US-AEP's shift to a field-based program, which occurred over FY 2002 - FY 2003. Prior to this change, US-AEP had been largely centrally managed by a Washington, D.C.-based Secretariat, with field-based USAID Country Managers coordinating and facilitating the activities and trips of US-based partners and, in particular, of trade and investment missions and related exchanges.

The shift to a field-based programming model increased the authority of Country Managers, including giving them primary responsibility for program planning. This shift in authority was accompanied by the introduction of a new planning system that emphasized the achievement of multi-year development objectives. With the shift to a more development-focused program, US-AEP activity became centered on annual country work plans designed to achieve specific environmental objectives identified by the field-based Country Managers. Funding, partner activities, and the use of grants were structured, for the first time, to support the achievement of those objectives.

These changes brought the US-AEP program more into line with traditional USAID planning processes and helped the program clarify its objectives. Reporting systems were also restructured to move away from a process that listed activities undertaken to a system that focused on progress toward the accomplishment of specific objectives.

FY 2003 PROPOSED CHANGES TO THE RESULTS FRAMEWORK

In addition to the changes described above, there was also a proposed change to the Results Framework. The move to revise US-AEP's management structure and shift operations to Bangkok prompted an exercise to revisit US-AEP's strategic framework in FY 2003. The intent of this exercise was to modify the program's objectives to better reflect US-AEP's post-DOC development orientation. Several workshops were held and a new Results Framework was proposed.

The proposed new Results Framework was intended to sharpen program focus on urban and industrial environmental issues; reduce the program's tendency to drift into areas outside of its core focus; and enable reporting measures to be developed that would emphasize impact on people and the environment. US-AEP, although an environmental program, did not track any performance measures that measured improvements in environmental conditions.

The new program strategy and Results Framework were never adopted as it was decided a more thorough strategic review of the program was warranted. A new regional program was designed based on a strategic assessment of development priorities in the region and a significantly reduced budget level. The new program, which builds on several key US-AEP initiatives, was approved in FY 2005 as part of the RDM/A's strategy statement.

V. ACTIVITY SUMMARY AND MAJOR OUTPUTS

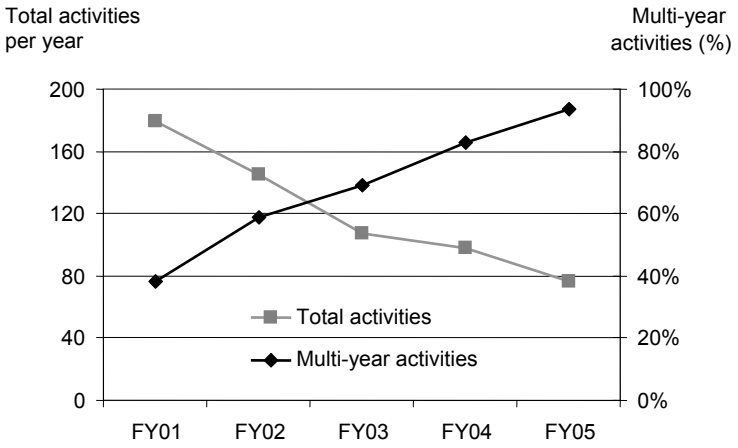
Since FY 2001, US-AEP program implementation was guided by annual work plans developed by country teams in each of the six primary implementation countries. In addition, beginning in FY 2002, US-AEP developed a regional work plan describing region-wide activities. Guided by these work plans, US-AEP activities were implemented in several broad areas or sectors. The first part of this section provides an aggregate summary of major trends in programming over the five-year period, highlighting changes in sector focus and differences among individual country activities. To illustrate the particular focus of each country program, this section also concludes with a summary of major activities and outputs for each of the six primary implementation countries.

PROGRAM-WIDE TRENDS

Trend toward more substantial activities: US-AEP country work plans name over 350 supported activities during the five years of implementation covered by this report. Over time, however, the number of activities US-AEP supported annually shrank from a high of 180 in 2001 to fewer than 80 in 2005. While the number of supported activities shrank, the nature and extent of activity support evolved. Fewer one-year/one-off activities were supported and instead support grew for multi-year activities (Figure 1). This programming change began after the withdrawal of DOC from the program as US-AEP became more aligned with USAID development objectives and trade and technology transfer were deemphasized. In addition, to develop these larger, more

sustained initiatives, activities were increasingly supported using multiple funding mechanisms and involving multiple, interrelated components, e.g., combining capacity building with public awareness components and funding support via grants, technical assistance and exchanges. This multi-year, multi-faceted support led to many of the most significant and sustainable US-AEP activity outputs and impacts.

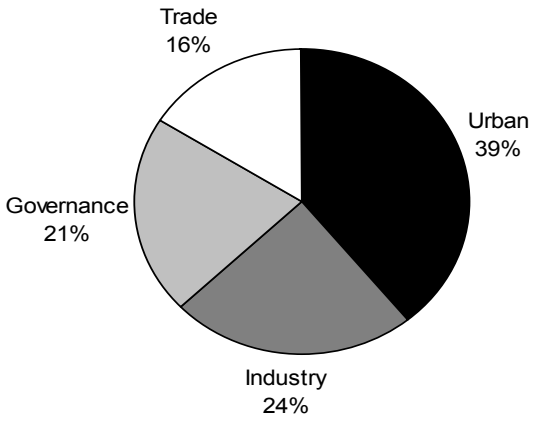
FIGURE 1: US-AEP ACTIVITIES (BY YEAR)



Evolving Sector Focus: When DOC withdrew from US-AEP in 2001, program support shifted away from trade promotion and increasingly focused on activities aimed at development of urban and industrial environmental management and crosscutting environmental policies and governance issues.

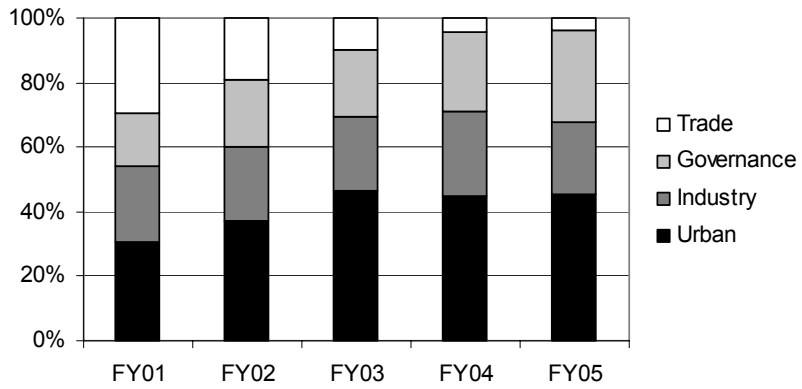
During the most recent five years of the program, the largest percentage (nearly 40 percent) of US-AEP supported activities focused on urban environmental issues. By contrast, industrial environmental management and environmental policy/governance activities each accounted for just over 20 percent of activities supported, while a relatively limited number of trade-focused activities were supported (Figure 2).

FIGURE 2: ACTIVITY SECTOR COVERAGE (FY 2001-2005)



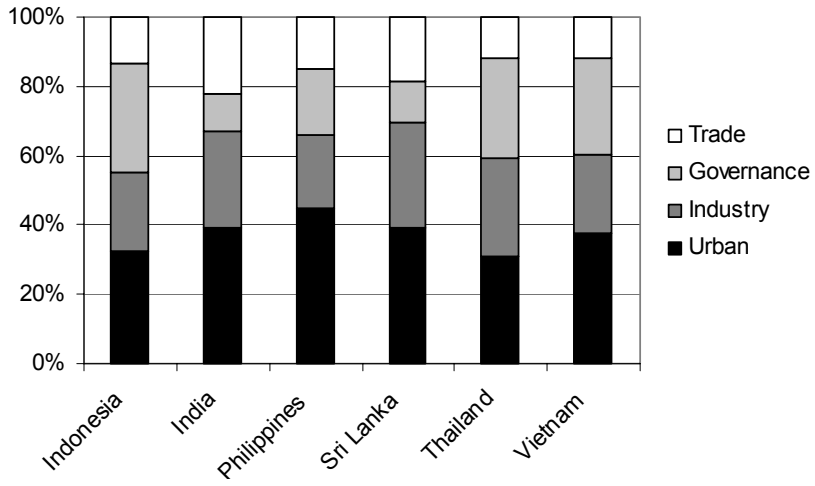
The number of trade focused activities also dropped over time, while the number of urban environmental activities increased. The number of activities focused primarily on environmental governance/policy and industrial environmental management remained relatively constant over the five years of this SO (Figure 3).

FIGURE 3: SECTOR BALANCE OVER TIME



Sector Focus by Country: The sector focus of each US-AEP implementing country varied somewhat during the final five years of US-AEP implementation (Figure 4). For example, in India and Sri Lanka about 20 percent of activities focused on trade promotion, while only about ten percent supported environmental policy/governance development. In Indonesia, Thailand and Vietnam just over ten percent of activities focused on trade, while about 30 percent supported development of improved environmental policies and governance. These variations in the focus of activity support were driven by priorities established by US-AEP country teams and the associated USAID country missions and reflected the increased importance of the Country Managers in the program's management. These efforts to align activity support with USAID mission objectives helped to expand the impact of US-AEP support and enhanced sustainability.

FIGURE 4: SECTOR BALANCE BY COUNTRY (FY 2001- 2005)



SUMMARY OF COUNTRY ACTIVITIES AND OUTPUTS

The following summarizes the major activities and associated outputs in each of the primary US-AEP implementation countries over the past five-years. These summaries are not comprehensive but indicative of the focus of country program implementation over the past five years.

INDIA: The US-AEP/India program was diverse and spread over a large geographical area with a large population, requiring four USAID Regional Managers in addition to a Country Manager to oversee operations. Developing public-private partnerships, supporting USAID/India objectives, working with the private sector, and collaborating with other donors and local and international NGOs was a salient feature of the program, as was close collaboration with U.S. government agencies, particularly the USEPA. A focus on technology transfer and support for trade in environmental technologies remained fairly strong in the program, as it did in Sri Lanka. Major activities and outputs in India included:

Air Quality Management. Activities promoted improved air quality management through science-based measures, including help from USEPA in source apportionment and introduction of USEPA's Benefits Mapping and Analysis program (BenMAP) in Pune. BenMAP is a computer-based GIS program that estimates the health benefits associated with air quality changes. The India program also worked on reducing vehicular pollution through promotion of cleaner fuels, developing an internal combustion three-wheeler fueled by metal-hydride storage technology, and improving inspection and maintenance. ***Outputs:*** A new Air Quality Management Cell established within the municipal government of Pune; and an enhanced on-road remote emissions measurement system for Indian two- and three-wheelers set up by a U.S. company, Environmental System Products; and a self-sustaining business association advocating for cleaner alternative fuel (liquefied petroleum gas) and fuel-adulteration testing center located in the city of Chennai.

Water Supply and Wastewater Treatment. Activities included support for improving the supply of clean drinking water, such as tackling unaccounted for water in cooperation with local urban bodies (in Nagpur), recycle and reuse of treated sewage water (in Delhi, Visakhapatnam, and Bangalore), and support for rainwater harvesting (in Rajasthan and West Bengal). Development of an urban drainage model also was supported in the city of Bangalore. US-AEP also provided support for the Alliance to Save Energy's "Watergy™" program, which promoted energy and water savings with partners like the Maharashtra Energy Development Agency. ***Outputs:*** Successful piloting of a system for recycling sewage for non-potable uses; provision of water to 17,000 residents of more than 200 villages in arid rural areas of Rajasthan and 500 schoolchildren in West Bengal; wastewater treatment for 40,000 residents of Vizianagaram through a public private partnership, a manual on best water and energy efficiency practices; and reclamation of a lake in the city of Mumbai in partnership with the U.S. company, Cleanflo Corporation, allowing use of the lake water for the city's drinking water supply; the first urban drainage model in India which will be useful for urban planning in a country that regularly struggles with flooding.

Solid and Hazardous Waste Management. Activities focused on building the capacity of urban local bodies (ULBs) in light of a Supreme Court order on rules for solid waste management. Initiatives included technical assistance for development of solid waste management master plans for cities, support for development of model tender documents to help ULBs procure needed services and infrastructure, and a partnership between San Diego and Hyderabad to promote best practices in solid waste management. ***Outputs***: 37 city master plans for solid waste management (20 in FY04 and 17 in FY05); a procurement and performance contract management support tool kit for city sanitation managers; a plan to cap the dumpsite in Hyderabad, proposal for a new sanitary landfill, and initiation of a feasibility study; development of a model landfill site in Nagpur based on a US-AEP supported study; recommendations for institutionalizing "advanced locality management" (community waste management) within ULBs; and state of the art hazardous waste treatment facilities (one completed in Hyderabad as part of a public-private partnership and one under construction in Haldia in eastern India).

Energy Efficiency and Renewable Energy. Activities included the Energy Wise India project, to promote industrial energy efficiency; support for development and implementation of an Energy Conservation Plan for the State of Maharashtra, the second most industrialized state in India; and promotion of an innovative public-private renewable energy partnership using captured methane to run micro-turbines, conducted together with U.S.-based Capstone Turbine Corporation and the West Bengal Renewable Energy Development Authority. ***Outputs***: An energy efficiency benchmarking tool for industry; a green house gas accountancy cell in West Bengal; an energy efficiency training curriculum for shop floor managers; a state-level action plan for industrial and municipal energy efficiency for the state of Maharashtra; and a signed commercial agreement for renewable energy generation using microturbines.

Civil Society Partnerships and Governance. Activities included development of the "Ecowatch" program, working with civil society in the states of West Bengal and Sikkim to preserve fragile ecosystems against indiscriminate tourism and an education program to build the capacity of teachers in schools and colleges to introduce a Supreme Court ordered environmental management course; work with USEPA on improved compliance and enforcement; and support for City Managers' Associations. ***Outputs***: A manual for teachers introducing composting measures at schools; increased public awareness on urban environmental issues; and an Ecowatch audio-visual documentary program and related materials for raising environmental awareness among schoolchildren and citizens; self-sustaining city managers associations in nine states of India; and the introduction of civil administrative authority and self monitoring in the recently drafted National Environment Policy .

Industrial Environmental Management. Notable activities included work on the Global Reporting Initiative (GRI); assisting the Delhi Metro Rail Corporation to achieve ISO 14000 certification; and work to address worker exposure to air-borne silica and dust in the stone-crushing industry. ***Outputs***: A training module on GRI guidelines for the textile manufacturing and hospitality sectors; Delhi Metro ISO 14000 certification; and education of workers on use of masks and installation of low-cost dust suppression measures.

Eco-Housing. Activities included working with housing development stakeholders in the City of Pune and developing measures to achieve eco-friendly housing goals. ***Outputs***: Benchmarks on energy and water consumption levels and waste generation; a pilot demonstration funded by program partners and the city of Pune which also includes a "green" low-cost housing component and "Ecotel" certification for the Orchid Hotel, which has franchised the certification across India and is now promoting the program in Sri Lanka.

INDONESIA: US-AEP/Indonesia worked in partnership with U.S. and Indonesian government institutions, civil society, businesses, and academia, as well as other bilateral and multilateral donors. The program acted as a catalyst to effect environmental change and improvements, particularly in the areas of improved air quality, and more efficient and effective water supply for urban areas. Major activities and outputs included:

Air Quality Management. US-AEP worked for more than five years to accelerate the phase-out of leaded gasoline in Indonesia, the last country in the region still using lead additives. Activities included teaming with local NGOs and other donors to broker government commitment to a phase-out deadline; sponsoring policy dialogues; and backing NGO advocacy and research efforts, including the first baseline blood lead study to measure the extent of lead exposure. US-AEP also supported related efforts by the government to reduce air pollution, particularly implementation of a recent decree mandating tighter emissions standards for new vehicles. US-AEP helped create the Indonesian Lead Information Center, an organization that provides information and advocacy related to the dangers of lead exposure. In collaboration with the University of Indonesia and the University of California, US-AEP's innovative Personal Exposure Monitoring Project used small air quality monitoring "backpacks" to measure actual pollution exposure for six at-risk groups including police and school children. ***Outputs***: Leaded gasoline phased out in the greater Jakarta area, Cirebon, Bali, and Batam, representing 40 percent of the national market and 16 million urban residents; several scientific studies providing baselines and monitoring information related to lead exposure levels; establishment of the Lead Information Center; and strengthened NGOs advocating for improved air quality.

Water Supply. US-AEP supported the National Association of Water Utilities (PERPAMSI) to develop more than 60 functional training modules to help new water utility managers grasp concepts of leadership, financial management, consumer relations, accountability and performance, community participation, and compliance with consumer protection regulations. US-AEP also partnered with PERPAMSI to design and implement a rerating analysis training, a practical exercise performed to determine if more water can be treated by existing water treatment plants at little or no additional cost. US-AEP helped create communication toolkits based on key water utility performance indicators targeting different water supply stakeholders – local government officials, legislative members and consumers. ***Outputs***: 83 directors and senior water utility managers certified; successful on-going delivery of manager training on a cost-recovery basis; 57 staff from 18 water utilities trained on rerating; a survey of local government administrators and parliamentary members in 15 municipalities to gather perceptions on their role in water supply and cost recovery, what they would need to support tariff increases, and a host of other related issues; toolkits distributed by PERPAMSI

to 20 water utilities and information provided to the public about the kits in relevant publications.

Industrial Environmental Management. Activities included support for the Indonesian Society of Sanitary and Environmental Engineers (IATPI) to improve the wastewater treatment plant (WWTP) operators' capabilities and develop a knowledge-based certification scheme; facilitating a partnership between IATPI and the Water Environment Federation (WEF) to help IATPI establish training and certification programs, and formulate training modules on topics ranging from the basic knowledge of wastewater sources and chemistry to planning and management; partnering with IATPI to develop a distance learning tool package for WWTP operators; and support to Alliance to Save Energy for a hotel energy efficiency program. ***Outputs****:* Four ratio talk shows developed to raise awareness of wastewater treatment, water quality and groundwater contamination; 17 trained WWTP operators trained; and approximately 500 training packages produced and distributed through IATPI branches and universities.

PHILIPPINES: US-AEP/Philippines, in close collaboration with the USAID Philippines Mission, facilitated U.S. and Asian partnerships to develop environmental policies, improve urban and industrial environmental management, and introduce technologies to solve specific environmental problems. Activities were guided by the US-Philippines Framework for Bilateral Cooperation in the Environment and Public Health, signed in July 2000 and reinforced in July 2002.

Public Policy and Environmental Regulations. US-AEP assisted in implementation and development of the Clean Air Act, Ecological Solid Waste Management Act, and Clean Water Act, as well as associated implementing rules and regulations. US-AEP worked with USEPA and the World Bank to expand dialogue on restructuring the Environmental Management Bureau and improving the Laguna Lake Development Authority's water resource management efforts. The program also enhanced government capability to enforce environmental laws and manage chemicals and hazardous wastes. Through US-AEP support, the National Water Resources Board piloted its decentralization efforts through the establishment of local Integrated Water Resources Management Councils. ***Outputs****:* Improved implementation of the Clean Air Act and Clean Water Act; interactive training modules for the Philippine Judicial Academy; and strengthened capacity of regional trial courts to hear environmental cases (patterned after the Green Bench initiative in Thailand).

Urban Environmental Management. Activities focused on increasing the capacity of local governments to address the environmental impacts of urbanization, including adoption of environmental management systems at the local level, development of low-cost wastewater treatment facilities, and use of municipal bond markets to finance environmental infrastructure. A major US-AEP effort to mobilize support for city Clean Air Programs (CAP) included design and implementation of public awareness campaigns on the health effects of air pollution. ***Outputs****:* CAP information campaigns conducted in two pilot cities; local CAPs implemented in five cities; a pilot Water Quality Management Area designated; low-cost wastewater treatment systems developed in several cities; septage management programs developed at both the city and neighborhood level in two cities; and sustainable financing mechanisms for providing solid waste services established in three cities.

Industrial Environmental Management. US-AEP promoted cleaner production technologies and adoption of ISO 14000-based Environmental Management Systems (EMS) on a pilot basis among industries, and promoted supply chain environmental management with corporations such as Nestlé and Ford. US-AEP provided technical assistance to PEPP, a government-industry initiative to promote improved industrial environmental performance through self regulation and accountability. US-AEP also convened roundtable discussions to promote use of cleaner production technologies and energy efficiency. ***Outputs****:* Adoption of ISO 14000 EMS on a pilot basis among industries in three cities; participation by some of the top polluting industries in the PEPP program and development of environmental management plans (EMPs) for 16 industry associations; and institutionalization of "Greening the Supply Chain" by Nestlé.

SRI LANKA: The US-AEP program in Sri Lanka promoted partnerships and public-private collaborations to identify and introduce better environmental practices, including assistance to develop or change environmental policies and legislation, improve awareness of environmental issues, and identify and promote best practices and technologies to address environmental problems. Technology transfer, in particular, was a key program element. Main activities and outputs covered the following areas:

Air Quality Management. A major initiative provided support over three years for development of a new vehicle emission testing program through capacity building, exchanges of best practices, technical assistance, and raising of public awareness. US-AEP also supported clean air action planning, air quality indexing, and ground-breaking work on noise pollution regulation. ***Outputs****:* A baseline study on emission characteristics identifying classes of vehicles to be targeted for pollution control; Sri Lankan government contracts with a U.S. and Australian company to contribute to the new mobile vehicle emission testing program and legislation and protocols to verify operation of testing centers; development of the Clean Air Action Plan 2007, resulting in a number of important policy changes and interventions, including the phasing out of leaded fuels; introduction of low sulphur diesel; development of the Sri Lanka Air Quality Index (SLAQI); and a pilot study to understand noise pollution patterns in a the Dehiwala Mount Lavinia municipal council area successfully completed.

Solid Waste Management. Activities included support for development of hospital waste sorting and waste-to-energy schemes; technical assistance, training, and testing equipment for the establishment and operation of a composting facility in Colombo; improved plastic processing technology to increase the value of recycled plastic as part of microfinance model for low income women's groups; and a partnership between Wisconsin, Minnesota, and Sri Lanka to exchange best practices for industrial waste management. ***Outputs****:* One model hospital "waste to energy" biogas system successfully introduced; a public-private partnership that includes a 25-year contract for the provision of waste processing services in Colombo; reduction in solid waste and sustainable production of compost in Colombo; 45 small women's groups formed, each with about 10 families benefiting from plastic recycling; and an internet-based waste exchange mechanism established.

Energy Efficiency and Water Supply. Several activities supported improved energy efficiency and water supply delivery. These included implementation of a database system to benchmark the energy saving potential at different operational levels in hotels and conduct of follow-up audits; testing the viability of small wind turbines combined with water pumping and treatment systems in remote villages; creating awareness of energy efficiency opportunities and best practices and building technical capacity in the water supply sector; and linking private U.S. donors of tsunami water supply relief with local partners. ***Outputs****:* An off-grid wind power system providing power to 35 houses, two community centers and a church, along with an associated a water purification system powered by wind power; reduction in water utility electricity demand by about 20 percent in the Greater Colombo water treatment facility; 25 engineers and more than 100 senior technical staff trained on efficient operation and management of water treatment facilities; and US$ 2.3 million worth of water pumping and purification systems installed in 46 tsunami affected locations.

Wastewater Management. Activities supported piloting of oil separation technologies and subsequent water recycling, and supported exchanges for and technical assistance to a Sri Lankan champion of waste-to-energy technology who is applying the technology to industrial wastewater treatment. ***Outputs****:* Pilots of oil separation technology, and a wastewater treatment and energy recovery project.

Other key activities included support of environmental education via the Community Led Environmental Awareness Network (CLEAN) that is now allowing students to monitor air and water quality in four major cities in Sri Lanka, and capacity building among government agencies to assist in post-tsunami rehabilitation planning using GIS applications.

THAILAND: US-AEP/Thailand worked closely with a range of partners – including government agencies and civil society groups – to promote improved laws and policies, strengthened institutions, and improved environmental management practices. The program focused on establishing strategic counterpart linkages to address environmental challenges.

Environmental Governance. US-AEP aided implementation of new regulations on public consultation and supported establishment of a public participation center of excellence to train government and civil society representatives. The program also worked to prevent and resolve environmental disputes by supporting the development of improved policies, practices, and institutions. Activities supported improved compliance and enforcement through policies and practices that strengthened Ministry of Natural Resources and Environment efforts to decentralize core functions to regional offices. ***Outputs****:* Training on mediator skills provided to over 400 representatives from communities and central, provincial, and local governments and 37 trainers prepared to continue training; a pilot project that identified strategies for resolving problems and developing action plans to mediate disputes; green benches established at the Supreme Court and at the Court of Appeals in Region 8 (Rayong Province); 30 senior judges trained on environmental law; a public participation handbook including public participation principles, tools and techniques incorporated in the recently amended Prime Minister Public Consultation Regulation; and 25 trainers from various Thai government agencies trained to deliver public participation training nationwide.

Air Quality Management. Under the DIESEL project US-AEP, the World Bank, Maryland Department of the Environment, Thailand's Pollution Control Department and private sector technology companies partnered to pilot activities to promote reduced public bus emissions through improved policies and technologies, and increased stakeholder awareness. US-EPA, USEPA and the Maryland Department of the Environment also provided technical assistance and training to help Chiang Mai metropolitan area develop an air quality master plan. ***Outputs***: 20 pilot vehicles in Bangkok from four representative bus fleets were retrofitted with new fuel burning technologies to demonstrate the effectiveness of these technologies in reducing emissions; release of the first air quality management (AQM) plan in 2002 in Chiang Mai, including a detailed emissions inventory; participation of Chiang Mai City staff in on-the-job training on all aspects of air quality management.

Community-Based Environmental Management. Under the Maryland/Thailand Partnership, US-AEP supported community-based environmental management, pollution prevention, and watershed protection activities to reduce pollution of the Thachin River. ***Outputs***: A community watchdog program launched by the Governors of Nakhon Pathom and Samut Sakorn replicating Chesapeake Bay's River Keeper Program; an organic farm training manual, three demonstration farms, a public learning center, and work with local schools to encourage eco-friendly farming; enhanced capacity of the We Love Thachin Clubs on fund raising, public awareness campaign development, proposal writing, budget planning, and project implementation; monthly water quality monitoring programs established at fourteen Thachin River basin schools; and establishment of the Thachin Technical Network (TTN) to advise local stakeholder groups on efforts to improve river water quality.

Municipal Environmental Management. The CityLinks program strengthened municipal management, improved public service delivery, and encouraged citizen participation in three cities – Chiang Mai, Khon Kaen, and Phuket. US-AEP also assisted the College of Local Government Development to improve city management curricula and training materials. ***Outputs***: Development of a manual on public participation techniques and practices for Thai municipalities, and distribution of 5,000 copies of the manual; a conference highlighting accomplishments, challenges, and lessons learned as a result of the partnership program with the City of Portland; a training session on public participation techniques for 38 participants from Thai cities; 300 city officials trained using improved course curricula for municipal manager training programs; and a draft citizen survey protocol piloted in six cities.

Solid Waste Management. US-AEP partnered with the World Bank to conduct a municipal benchmarking exercise on solid waste management (SWM). The exercise measured the performance and level of SWM service for 13 Thai cities using standardized indicators. *Output:* Publication of a SWM benchmarking study used by the World Bank for its annual Thailand Environment Monitor publication.

VIETNAM: US-AEP/Vietnam worked to strengthen environmental laws and policies, build capacity of government agencies and environmental champions, introduce international best practices, and help Vietnam forge new international linkages. The program focused particularly on providing technical assistance and creating regional linkages to enhance knowledge and share

lessons among Asian partners in air quality management, community-based environmental management, and hazardous waste management.

Environmental Governance. US-AEP worked with key leaders on approaches that leveraged economic incentives and citizen involvement such as promoting the use of pollution charges and environmental funds, linking revenue generation to industrial growth. Community-based environmental management activities in Ho Chi Minh City facilitated citizen participation in cleaning a polluted urban canal. US-AEP also helped improve water resource allocation planning through use of public engagement, economic tools, and consideration of environmental impacts. ***Outputs:*** Establishment of Vietnam's Environmental Trust Fund; a promulgated pollution charge degree; established linkages with South Africa on water resource allocation issues; and strengthened institutional capacity and private sector investment in environmental protection.

Urban Environmental Management. US-AEP/Vietnam played a key role in promoting and supporting improved air quality through stricter emissions and fuel standards, enhanced stakeholder coordination, and better air quality monitoring. US-AEP also supported improved solid waste management in Ho Chi Minh City through changes to the legal framework for informal waste collectors. ***Outputs:*** Tighter government emissions standards for new motorcycles; a national network of air quality management stakeholders established; government commitment to introduce stricter European (EURO) 2 standards in 2007 for new vehicles and fuels; and improved service provision by solid waste collectors in Ho Chi Minh City.

Industrial Environmental Management. US-AEP formed a partnership with the Ministry of Industry to support efforts to promote sustainable development in some of the most highly polluting industries - oil/gas, textiles/garments/footwear and chemicals. Major activities included sharing best international practices in industrial environmental management planning for these sectors, promoting clean environmental technologies, and introducing eco-industrial development to industrial parks. US-AEP also promoted adoption of the voluntary environment, health and safety codes within the chemical sector (Responsible Care), and provided technical assistance in cooperation with USEPA on proper management of hazardous wastes. ***Outputs:*** Environmental protection measures included in the national guidelines for the chemical, textile and electricity sectors; techniques adopted by Nike to recycle leather waste; Responsible Care core team, charter, action plans, and national office established; development of Vietnam EPA's first environmental permit to incinerate hazardous wastes in cement kilns; development of a management plan for the handling, treatment and disposal of PCBs in the power sector.

VI. SUSTAINABILITY

The very nature of US-AEP, with its focus on partnerships and its objective to have a "sustained impact on the key people, institutions, and forces that drive the movement to a clean revolution in Asia," means that the sustainability of program activities and outcomes was an integral part of the activities themselves. Three specific areas, however, may be cited as having made the strongest contributions to sustainability. These were US-AEP's focus on:

- Substantial capacity building activities for key organizations, agencies, and environmental leaders/champions, which ensure that individual and institutional partners are equipped to carry on work begun in collaboration with US-AEP;
- Developing, expanding and strengthening U.S.-Asian and Asian-Asian networks and linkages, which have resulted in the types of long-term relationships among program participants that will allow them to continue to interact and network among themselves; and
- Establishing new, self-sustaining institutions that provide a base for continuing efforts to improve the environment in the region.

In addition, substantial contributions (both in cash and in-kind) made by local counterparts and other donors and partners demonstrate the commitment of these partners to initiatives and bodes well for continuation of many of these activities. These contributions totaled $23.8 million over the past five years, an amount equivalent to approximately 30 percent of USAID funding for US-AEP over the same period.

Following are several examples of US-AEP supported activities that demonstrate the program's success in achieving sustainable results.

A hallmark of US-AEP activity has been work at various levels – national, city and community levels and often within industrial sectors – to **enhance the capacity of organizations and individuals** to effectively deal with environmental challenges. Following participation in an exchange to learn about solid waste management that included an introduction to the Solid Waste Association of North American, Mary Jane Ortega, Mayor of San Fernando, Philippines, returned home to create SWAPP, the first association of its kind in Asia. She also assisted 100 local governments in developing waste management plans and secured a $1.3 million World Bank loan to convert San Fernando's dumpsite into an engineered sanitary landfill modeled after those she saw on her US-AEP exchange to the U.S. Mayor Ortega continues her environmental activism. She most recently launched a Clean Air Program in San Fernando to reduce vehicle emissions, particularly from three-wheeled taxis, modeled on the US-AEP sponsored CAP program in Puerto Princesa.

In the Philippines and Vietnam, US-AEP cooperated with USEPA to build the capacity of local government agencies and private sector firms in proper management of hazardous waste management. USEPA experts developed several training modules, which were shared in multiple workshops over a period of more than two years in both countries for officers of national government agencies and representatives of key industries, such as chemicals and petroleum. As

a result of these training sessions, the Philippines has developed a national plan for responding to chemical and hazardous waste emergencies and established two emergency response teams at the Bureau of Fire Protection. Plans also exist to add more emergency response teams in the future. As mentioned above, the Vietnam EPA is now providing environmental permits to incinerate hazardous wastes in cement kilns thanks to USEPA expert support.

As a regional program, US-AEP was able to **facilitate new linkages and partnerships** in various ways. Through exchanges, workshops and institutional partnering, US-AEP brought thousands of Asian leaders and environmental actors together to share experiences, learn best practices, and establish communication channels. This has often been cited by local stakeholders as one of the most valuable contributions of US-AEP, and often led directly to changes in policy or practices. Key examples include the strong partnerships developed between stakeholders in the Philippines, Thailand and the U.S. as part of US-AEP efforts to improve community participation in river basin management. NGO leaders from the Philippines have trained Thailand groups in fundraising skills, and several exchanges allowed stakeholders from both countries to share experiences and ideas as they develop and implement new approaches to river basin management. Based on the relationships developed as part of this activity, groups working to protect the Chesapeake Bay plan to continue support for similar activities in Asia. In addition, partnerships developed as part of the US-AEP CityLinks program brought representatives from the City of Portland, Oregon together with the Thai cities of Chiang Mai, Khon Kaen, and Phuket to improve public participation and delivery of urban services. These cities continue to work together and expand their efforts, particularly Khon Kaen, which has become a recognized leader in public participation methods nationally and is now training other Thai municipalities in their use.

Finally, US-AEP directly contributed to the **establishment of several new organizations** that are now making sustained contributions to improving environmental conditions. As mentioned previously, US-AEP and the ADB helped establish SEAWUN, a regional organization of water utilities promoting improved delivery of water services throughout Southeast Asia. SEAWUN is a unique regional institution that promotes improvements in utility human resources development, benchmarking, full cost recovery, and unaccounted-for water. At the national level, US-AEP was instrumental in establishing SWAPP in the Philippines, and US-AEP has continuously provided support for the development of SWAPP training programs and materials. As a result, SWAPP is now an independent organization and the primary source of technical assistance on solid waste management for local governments in the Philippines. In India, US-AEP led effort to form new municipal associations in four States. These associations now work to improve urban service delivery through improved sharing of new approaches and international best practices to achieve environmentally sound and sustainable growth.

OPPORTUNITIES AND THREATS

While many US-AEP activities have generated sustainable programs and organizations, regional trends and events may have a significant impact on the ultimate sustainability of this environmental progress. On the positive side, there is a general trend in the region toward decentralization of government responsibility and greater civic participation in environmental management. A

continuation of this trend should help nurture local programs and organizations that were established with US-AEP support, resulting in the continuation and strengthening of US-AEP program impacts.

At the same time, unpredictable future events may have a negative impact on the sustainability of US-AEP activities. For example, a major avian influenza outbreak or other health crisis in Southeast Asia could significantly drain resources and attention from environmental priorities. If some US-AEP initiated activities are at a critical point in developing self sustainability, an event like avian flu might result in the failure of programs that might otherwise have succeeded. In some parts of South and Southeast Asia, political events may threaten sustainability. A breakdown in the cease-fire in Sri Lanka could disrupt environmental progress there, or a political or financial crisis in any of the countries where US-AEP operated could derail positive trends.

Finally, increasing globalization in South and Southeast Asia presents both opportunities and threats to the sustainability of US-AEP initiated programs. For companies that export to developed economies there is pressure to improve environmental performance, for example, which will make participation in programs like Responsible Care and GRI more appealing. At the same time, increasing industrialization and economic growth made possible by globalization will, in the short run, likely increase use of vehicles and consumption of raw materials, and contribute to water and air pollution. US-AEP programs have, in many cases, helped prepare governments and civil society to better face these challenges, but there is a danger that the speed of growth, coupled with other, unforeseen problems, may make responding to new environmental challenges more difficult.

VII. LESSONS LEARNED

In 2005, US-AEP conducted a regional lessons learned activity[3] to identify the strengths (and weaknesses) exhibited by the program over the last five years in its attempts to achieve targeted results. By focusing on how the program worked, rather than what the program worked on, the lessons learned activity aimed to distill views relevant to USAID and others in future regional programming efforts applicable across a variety of technical areas and sectors.

The lessons learn activity began with an initial review of existing program documentation, which led to development of a questionnaire focused on frequently-cited, essential program characteristics. Interviews were then conducted with key program personnel from US-AEP country teams and implementing partner organizations to obtain information on the perceived importance of certain program characteristics. These staff and partners ranked the relative importance of these characteristics in the following order:

1) Ability to leverage other resources
2) Programming flexibility/opportunism
3) Regional program implementation
4) Partnership approach
5) Use of exchanges

Why these operational characteristics were seen to be important and what lessons were learned from applying them is summarized below.

RESOURCE LEVERAGING: Outside resources leveraged by US-AEP included substantial in-kind contributions from local partners and complimentary funding from other donors. This leveraging was important for US-AEP because of the limited size of available US-AEP program resources (e.g., small grants and short-term technical assistance was generally limited to $25,000 or less) and the large scale and varied nature of environmental challenges facing countries in the region. Leveraging additional resources was essential to US-AEP's success in both ensuring commitment to achieving results among partner organizations and achieving broad and sustained project impacts.

Actively developing and maintaining partner relationships was a key factor in US-AEP's ability to successfully leverage resources. The long-term presence, high visibility, and wide recognition of US-AEP country programs allowed the development of important relationships with other donors and in-country sector leaders. US-AEP maintained and developed these relationships by strategically using flexible program funding. One way this was accomplished was through "gap filling," where small grants, technical assistance, or exchanges were used to advance larger initiatives supported by other donors and local partners.

[3] The publication US-AEP Key Lessons Learned and Best Practices is attached as an appendix.

Many program staff and partners also emphasized that successful leveraging often resulted from using program resources as catalysts to advance innovative solutions. This "venture capital" approach facilitated piloting of a number of successful technologies and policies. By demonstrating these successes, US-AEP was able to leverage subsequent large-scale support to expand these pilots, either with additional USAID or outside funding.

PROGRAM FLEXIBILITY: In addition to resource leveraging, another noted US-AEP hallmark was the flexible nature of its activity support. Although individual country programs were guided by annual work plans, it was possible to provide previously unplanned support using small grants, technical assistance, and exchanges on short-notice for strategically important activities. This flexibility allowed for small, but effective rapid response to changing needs and emerging opportunities.

Although program flexibility helped leverage other resources and succeeded in promoting innovative programming, staff and partners cautioned that a careful balance must be struck between flexible, rapid reaction and sufficient planning. Some staff thought that when flexibility was overemphasized, programming lost the focus needed to ensure significant impact. Sufficient planning was also needed to allow for some key project inputs. For example, it was sometimes difficult to quickly mobilize support from large institutional partners like the USEPA, which require significant lead time to arrange staff travel and prepare technical inputs.

In addition, most staff and partners agreed that many of the more successful US-AEP supported initiatives were those involving long-term engagement and support. To successfully promote objectives like policy reform and institutional development, US-AEP needed to develop and follow through with long-term plans, strategies, and partner relationships. Thus, although program flexibility was often useful, it was most successful when carefully combined with careful planning and long-term commitment to particular initiatives.

REGIONAL NATURE: US-AEP was more than simply a number of individual country programs supported by a regional funding mechanism. Although each country program had unique characteristics and was designed in accordance with local priorities, the US-AEP regional framework allowed for efficient and effective use of many program resources, particularly US-based inputs like those from USEPA. Country programs also benefited greatly from intra-regional sharing of experience and expertise and joint programming in common areas. In some situations, US-AEP-supported regional initiatives have become institutionalized. Important examples include SEAWUN and AECEN.

To benefit from regional interactions, program staff and partners stressed the need to actively foster such cooperation. Cross-fertilization between country programs was typically spawned when program staff and partners had opportunities to gather regionally for meetings, conferences or exchanges. As the program became increasingly field-driven in its final years, some staff and partners felt that opportunities for such productive regional interaction declined.

Program participants also found that the most successful regional initiatives were those that developed out of self-defined, country-specific needs and demands. Initiatives driven largely by the interests of outside partners often had difficulty developing consistently at the local level.

PARTNERSHIP APPROACH: US-AEP promotion of partnerships between U.S. and Asian counterparts proved highly successful in addressing technically complex environmental pollution problems in Asia. US-AEP support of in-country partnering was also found to be effective in forging the local cooperation necessary to overcome these challenges.

Staff and partners found that it was difficult to define a universal "good partner." The success of partnerships typically depended on proper alignment of partner interests and project objectives. Staff and partners also stressed that the objective of partnership development should *not* be partnering itself but rather a clearly targeted result.

In the program's attempts to promote sustainable partnerships, it was found that individuals, not organizations, were most likely to maintain partnerships over time. US-AEP fostered the development of personal links between many key environmental policy makers and technical specialists that have resulted in successful on-going cooperation. The exchange mechanism was particularly useful in this regard.

USE OF EXCHANGES: An important element of partnership development was the opportunity to meet face to face, which was made possible through exchanges. Exchanges included the multitude of US-AEP-supported activities that brought people together to learn from one another. Through international and in-country travel, US-AEP supported the participation of environmental professionals in study tours, conferences, training programs, videoconferences, and consultations that allowed them to learn from, and be inspired by, counterparts with whom they could not ordinarily interact. These interactions were vital to the successful development of most US-AEP initiatives. Effective use of the exchange mechanism was also integral to development of US-AEP's favorable image in the region.

Staff and partners felt that the most successful exchanges were those where extensive pre-planning was conducted. The best exchanges involved carefully identified participants who were prepared to actively participate in the exchange, and the right hosts who were well briefed on exchange objectives. The most effective exchanges also involved active and substantive follow-up. Exchanges often motivated participants to consider implementing new technologies or policies once they returned. When US-AEP strategically supported such initiatives with small grants and technical assistance, many successes resulted.

CONCLUSIONS: A central lesson learned from US-AEP implementation was the importance that program staff and partners saw in carefully balancing application of these distinct program characteristics. In particular, it was important to balance:

- The flexible programming approach *and* sufficient planning and long-term commitment to important initiatives; and
- Responsiveness to local, individual needs *and* regional and partner synergies.

In attempting to strike this careful balance, local and U.S. partners noted the invaluable contributions of US-AEP country program staff. The long-term in-country presence of US-AEP staff promoted effective partner cooperation, successful technology transfer, and useful policy

reform. Guided by the common view that "activities are people," US-AEP staff were able to build the trust and understanding between organizations and individuals that was central to the success of this unique regional partnership program.

VIII. SUMMARY & ASSESSMENT OF PERFORMANCE INDICATORS

In general, the performance indicator system, which remained constant throughout the period covered by this report, was adequate for measuring the program's principal emphasis, which was partnership development. The performance indicator system, however, was not designed to provide a direct measure of environmental impact. This was periodically viewed as a short-coming of the monitoring system, as the indicators did not track effectiveness in producing environmental improvement. The program's strategic objective and performance indicators, however, were consistent with US-AEP's early focus on partnership development and the sale and transfer of U.S. environmental technology as a way to improve environmental conditions in Asia. The program's early assumption was that market forces would drive the adoption of new and improved technology, which in turn, would improve environmental conditions.

In lieu of environmental indicators, US-AEP used several other mechanisms to collect information on the program's ability to improve environmental conditions. Most common among these mechanisms was the development of newsletter articles and "success stories." These narrative vignettes provided detailed information on the impact of particular actions within the project's focus areas. Success stories and newsletter articles were regularly produced throughout the project. In addition, once the project shifted its operations to Bangkok, a new planning and reporting system was put into place. This system placed an emphasis on country-level planning and reporting, and required country managers to report progress in implementing multi-year activities. This became a second reporting system, based mainly on narrative summaries, which permitted program managers to review progress against specific program objectives. During this time, information also continued to be collected on the project's official set of performance indictors.

Below the strategic objective level, the performance indicators mainly dealt with output-level measures, i.e., measures that captured the volume of US-AEP activity in the program's main sectors of operation. This was a practical way to gain a sense of the level of operation and output from a project that implemented a diverse, demand-driven set of activities in multiple countries. However, these measures did not capture the effectiveness or impact of the activities counted. The reporting system was not clear whether, for example, improved practices meant holding a workshop, or whether it meant implementing improved solid waste collection for millions of people – both actions were often counted in the same category, that of an improved "practice." On the whole, however, the individual performance indicators used by the program were effective at measuring what they were designed to measure, i.e., the objectives contained with the US-AEP Results Framework. Comments on particular performance indicators follow.

TABLE 2: SUMMARY AND ASESSEMENT OF PERFORMANCE INDICATORS

Strategic Objective: Sustained impact on the key people, institutions, and forces that drive the movement to a clean revolution in Asia.	
1a: The number of new, continuing and self-sustaining U.S.-Asian partnerships.	Useful as a measure to determine US-AEP's success at forming partnerships, although the distinction between "continuing" and "sustainable" partnerships was difficult to measure, and of limited value, since clear definitions and criteria were not used.
1b: The number of U.S. and Asian institutions participating in US-AEP supported knowledge transfer activities.	The indicator provided a sense of the number of partners engaged in the program, an important measure, as one of US-AEP's roles was to catalyze partnerships.
1c: The number of individuals from Asia participating in US-AEP supported knowledge transfer activities.	Useful as a measure of number of participants from the region supported by the program.
1d: The percentage of total resources (used to support US-AEP activities) that are leveraged from non-USAID resources.	Useful to determine the extent of partner contribution to the program, but it proved difficult to collect consistent information between countries and partners. This led to significant changes in results from year to year.
Comment: On the whole, the above SO-level indicators taken together provided a useful measure of participation and "partnership" in the program, per the strategic objective. In particular, this provided validation of the program's operational focus, which included leveraging funds, building partnerships and engaging multiple partners on a demand-driven basis.	
IR 1.1 Improved public policy and environmental regulations.	
1.1a: Number of environmental policies, laws and regulations strengthened through US-AEP activities.	This was a useful way to measure program focus and impact on policy support, which became increasingly important as the program evolved. The indicator did not measure the impact or success of particular policies, or changes that came about as a result of new policies being implemented.
1.1b: Number of formal systems set up by Asian government units to capture environmental data.	This was useful for measuring the program's focus in this area, although it was not an explicit objective of the program.

IR 1.2: Improved Urban Environmental Management	
1.2a: The number of LGUs and public agencies implementing new or improved urban environmental management practices, policies and infrastructure programs.	This measure gave a sense of the breath of the program's support to local governments, although the interpretation of new "practices" was vague, and included anything from a new participatory planning process to improved cost-recovery among water delivery systems. There was no indicator to capture the scale or magnitude of new practices being implemented, e.g., whether it was a one-off improvement or a system-wide improvement affecting millions of people.
1.2.1a: Number of new or strengthened NGOs/associations/networks organized around urban environmental issues.	The measure as defined most directly captured the number of institutions that were delivering a service with US-AEP funding support. The measure assumed an organization was "strengthened" because it was presumably delivering more services than it did prior to receiving US-AEP support. However, the indictor did not provide an assessment as to whether NGOs or associations were themselves strengthened through having increased capability, such as improved planning processes, better trained staff, better cost-recovery/sustainability, or increased membership. Undoubtedly, many organizations were strengthened through their association with US-AEP, but there was no process for targeting or measuring the type of strengthening that occurred.
1.2.2a: Number of new or improved urban environmental management practices and policies implemented by local government units and public agencies.	As above – 1.2.a
1.2.3a: Number of local projects implemented that result in the addition or improvement of environmental infrastructure or equipment.	Assuming counted infrastructure additions or improvements necessarily led to improved environmental conditions, this measure was one of the few with the potential of measuring actual impact on regional environmental conditions. However, as a simple count of "projects", this measure was insufficient to assess the scale of any environmental improvements, e.g., infrastructure added for a large city affected or only a few homes, large improvements or only minor.

IR 1.3: Improved industrial environmental performance	
1.3.1a: Number of US-AEP supported corporate programs established for transparent reporting and disclosure.	This was a useful measure for determining US-AEP's ability to support the development of stronger environmental commitment and increased accountability among Asian corporations.
1.3.2a: The number of US-AEP-supported networks and associations established and/or strengthened to promote environmental management systems and cleaner industrial production.	As above – 1.1.2.a
1.3.3. a: Number of US-AEP assisted Asian institutions involved in international industrial-environmental dialogues.	This measured the number of organizations that participated in select meetings, and was not useful in terms of measuring what was accomplished in dialogues/meetings.
IR 1.4: Increased transfer of U.S. environmental technology, expertise, and practices to Asia through trade and investment.	
1.4a: The dollar value of US-AEP-assisted sales of U.S. environmental equipment and services.	This was an important measure of success when the program was focused on increasing investment and sales of U.S. environmental technology in Asia. Once the DOC withdrew from the program transactions were no longer the main focus of the program, and this indicator was no longer representative of the program's operational focus. From FY 2003, US-AEP stopped collecting and reporting this data.
1.4e: Increased transfer of U.S. environmental technology, expertise, and practices to Asia through trade and investment.	Once the DOC withdrew this indicator was no longer of significant value. However, the number of transactions did continue to be tracked, particularly by India, which continued to focus on technology transfer as one of its core program strategies.

IX. CONCLUSIONS

Performance indicator measures and program activity impacts demonstrate that US-AEP made significant contributions to achieving the SO of a "sustained impact on the key people, institutions, and forces that drive the movement to a clean revolution in Asia." These contributions were made by building strategic Asian-Asian and U.S.-Asian partnerships, strengthening the capacity of local governments and civil society groups, and disseminating international standards and best practices related to urban and industrial environmental management and environmental governance.

US-AEP's unique partnership approach meant that, by the very nature of its activities, the program's impacts are more likely to be sustainable than most traditional assistance programs. Through many years working closely with – and in some cases helping establish – local and regional organizations, US-AEP leaves behind a legacy of literally thousands of individuals and organizations with increased capability and additional tools to effectively deal with environmental challenges. US-AEP helped governments craft and enforce more effective environmental laws and regulations, promoted the involvement of local communities in environmental protection and management, piloted innovative approaches to environmental management, and established models that are increasingly being used throughout the region – all example of ways in which US-AEP's influence will continue for years to come.

Over the past five years US-AEP activities evolved into more targeted, field-driven, multiple-year initiatives focused on achieving development impacts. The culmination of this trend is seen in RDM/A's new regional environmental program, which utilizes regional platforms to target several key environmental challenges in the region. The new program continues work with several regional organizations established with US-AEP support (e.g. SEAWUN and AECEN) and will build on the regional linkages, enhanced knowledge base, and best practices disseminated under the US-AEP program.

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ANNEXES

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ANNEX 3 – SELECTED REPORTS AND PUBLICATIONS

Solid Waste Benchmarking Study in 13 Thai Municipalities
Fuel Quality Best Practice Overview: Vietnam
Sustainable Management of Water Flows: Vietnam
Civil Society Partnership: India
Public Awareness Campaigns for Improving Air Quality: Regional
Public Participation Techniques and Practices for Thai Municipalities
Evaluation of the US-Asia Environmental Partnership, June 2002
US-AEP Strategic Assessment Report, September 2004

USAID | INDIA
FROM THE AMERICAN PEOPLE

CASE STUDY
A City Finds a Windfall in Efficiency

A new approach increases efficiency in energy and water use

Photo: Alliance to Save Energy

Efficiency improvements at the central water supply system in Vizianagaram mean more money for other services.

"Money saved can be redirected to better municipal infrastructure, and better environment and social development interventions for the welfare of the poor," said Somesh Kumar of the Department of Municipal Administration and Urban Development.

Challenge

Indian cities and towns are facing the challenges of growing populations and urban expansion, and, for many, direct access to clean, affordable and reliable drinking water remains a dream. Only a fraction of the urban population has direct access to clean piped water, often because of inadequate and inefficient supply systems. The situation in the southern city of Vizianagaram — home to 200,000 — is a case in point. Water supply is inefficient and waste is high. Women have complained to government officials that water is supplied only once in three days in poorer parts of the city. Water and sanitation-related diseases are a serious problem, with levels among the highest in Andhra Pradesh.

Initiative

USAID supported the development of Watergy, one successful approach to resolving these challenges. Since most municipal water utilities in India spend nearly 60 percent of their budgets on energy costs for water pumping, Watergy works to increase energy efficiency as a starting point. With a more efficient process, cities can optimize energy use, reduce water waste and ultimately improve water services. In partnership with the state government of Andhra Pradesh, USAID helped launch Watergy in Vizianagaram to promote the concept throughout the state and demonstrate that it works.

Results

Vizianagaram municipality has already put 80 percent of the proposed energy savings measures into practice. The city now saves more than 100 megawatt-hours of energy and $63,700 annually — slashing its energy costs by 18 percent and eliminating 600 metric tons of carbon dioxide emissions. The measures have also reduced water waste through more effective supply and distribution, and according to local officials, the energy cost savings frees up money for other needed urban services.

Telling Our Story
U.S. Agency for International Development
Washington, DC 20523-1000
http://stories.usaid.gov

Cleaner Air for 400,000 Residents in India

Challenge

For years, 400,000 residents breathed air highly polluted by emissions from the 50-year-old coal-fired power plant operated by Calcutta Electric Supply Corporation (CESC) - the largest private thermal power company in Eastern India. The plant relied on old technology that emitted particles significantly higher than India's regulatory standard. The effects of air pollution on the health of citizens living in the area can be devastating, leading to fatal respiratory diseases and heart problems. The CESC plant, one of 81 similar coal-fired thermal power plants in India, faced increasing pressure from regulators to control air emissions or close.

Photo: US Consulate Calcutta

USAID assistance reduced emissions at CESC plant.

"The air pollution mitigation project undertaken by CESC is really commendable. The application of this technology will help the local people breath cleaner air and reduce concerns from environmentalists."

- Subhas Datta, Howrah Democratic Citizen's Forum

Initiative

USAID utilized proprietary technology from Beltran, a small New Jersey-based company, to help improve the CESC plant. To replace the 130 megawatt plant, which still has another ten years of life, with one of similar capacity would have cost about $60 million. In addition, shutting the plant down would have resulted in the loss of jobs for local residents.

To promote a productive partnership, USAID facilitated a project demonstration that led to an agreement between CESC and Beltran to install the air pollution system for all eight of its coal-fired boilers. The technology, new to India, will reduce emissions at the plant and is more efficient than the conventional equipment currently used to limit pollution generated from the plant's emissions.

Results

Emissions from fossil fuel combustion, especially coal, are major contributors to air pollution in India. Before USAID helped revamp the plant, the city of Kolkata's air pollution levels were among the highest in the world. The air pollution control system installed in the CESC plant have reduced emissions from 500 - 1,000 to 10 - 20 micrograms per cubic meter, substantially less than the regulatory standard. CESC's 400,000 neighbors are breathing cleaner air, with markedly reduced particulate matter - the chief cause of respiratory ailments. The reduction also prevents the CESC facility from closing, saving 700 jobs of primarily local residents who depend on the plant for their livelihoods. USAID plans to share the technology with other similar coal-fired power plants in India.

Case Study

USAID | INDIA
FROM THE AMERICAN PEOPLE

CASE STUDY
Harvesting the Rain

Arid regions find new ways to collect and manage scarce water

Photo: Jal Bhagirathi Foundation

Residents fill up at a harvesting structure, which has made water readily available for drinking, agriculture and sanitation during the dry season.

Since the program began, 82 water harvesting structures have been built, providing ample water sources to the 17,000 residents of more than 200 villages.

Challenge

For villagers in the arid Marwar region of Rajasthan, India, decreasing groundwater levels and repeated droughts have destroyed traditional livelihoods. During the long dry season, farmers and herders get most of their water from wells. In recent years, some groundwater levels have dropped as much as 400 feet. One of the world's most densely populated arid regions, Marwar's droughts starve cattle and cause mass migration of people and their livestock. Farmers are forced to pay a high price for drinking water transported great distances by tankers, and many fall into debt taking out loans from local moneylenders.

Initiative

With support from USAID, India's Jal Bhagirathi Foundation helps communities design, build and manage systems that harvest rainwater. Since abundant rain falls during the summer monsoon season, communities are shown how to preserve some of the rainwater for use in the dry season — which also helps raise the groundwater level. Jal Bhagirathi has also helped village communities better manage water resources by rehabilitating traditional water harvesting structures, constructing new ones and developing sanitation facilities for schools. In Jodhour and six other districts, *jal sabhas* (water groups) have been formed to raise awareness of water management techniques that improve conservation, eliminate erosion and increase vegetation.

Results

Since the program began, 82 water harvesting structures have been built, providing ample sources of water to the 17,000 residents of more than 200 villages. The rainwater collected in newly built *johads* (small earthen check-dams) has helped recharge wells, increase vegetation and food production, and, in many areas, brought displaced people back to their homes. In Alwar district, investment in *johads* has resulted in a 300 percent increase in economic production. Through local and effective management of this precious resource, communities have become, once again, self-reliant, actively participating in the long-term management of their natural resources.

USAID | INDONESIA
FROM THE AMERICAN PEOPLE

CASE STUDY
Getting the Lead Out

A phase-out of leaded gasoline makes Indonesian cities healthier places to live

Photo: Budi Haryanto, University of Indonesia

Tests reveal that children's blood lead levels have significantly decreased since Indonesia began phasing out leaded gasoline.

Getting the lead out of gasoline has been a critical first step in making the air in Indonesia safer for everyone.

Telling Our Story
U.S. Agency for International Development
Washington, DC 20523-1000
http://stories.usaid.gov

Challenge

Indonesia was one of the last countries to widely use leaded gasoline. A 2001 study sponsored by USAID found that 35 percent of children tested in Jakarta had elevated blood lead levels. Children are more vulnerable than adults to lead poisoning, and even low blood lead levels can affect brain development, cause behavioral disorders and reduce learning ability and intelligence. The primary source of exposure is leaded gasoline. Removing that lead, as has been done in India, China and most other Asian countries, will rapidly eliminate childhood lead poisoning. In Indonesia, the phase-out of leaded gasoline was planned but not implemented.

Initiative

USAID has worked for more than five years to promote the phase-out of leaded gasoline in Indonesia, educating the public about the dangers of lead and facilitating cooperation between the government, civil society, and international donors. In 2000, USAID teamed up with local organizations to broker a deadline with the Ministry of Energy and Natural Resources and the state-owned oil and gas company to phase out leaded gasoline. To encourage the government to follow through on its promise, USAID sponsored policy talks and backed the advocacy and research efforts of a consortium of three local organizations. USAID also helped establish a lead information center and funded the first baseline blood lead study to measure exposure and monitor progress.

Results

Leaded gasoline has been completely phased out in the greater Jakarta area, Cirebon, Bali and Batam — 40 percent of the national market that encompasses 16 million city dwellers. Jakarta's lead pollution has dropped by 90 percent. The city's 5 million children have markedly lower levels of lead in their blood, and thus, a much lesser risk of lead-related illnesses and impaired cognitive ability. With USAID's support, the Indonesian government has also begun to take steps to reduce air pollution, including a recent decree that mandates tighter emission standards for new vehicles. Getting the lead out of gasoline has been a critical first step in making the air in Indonesia safe for everyone to breathe.

USAID | ASIA
FROM THE AMERICAN PEOPLE

Certification and Training for Network Improvement Project (CATNIP)

A BEST PRACTICES CASE STUDY: INDONESIA

SUMMARY

Some 300 state-owned water service providers (PDAMs) in Indonesia are mandated to supply drinking water, but the real provision of potable water remains difficult due to various institutional, technical and financial factors. Currently, clean water is available to about 35% of urban dwellers, and nearly all of them boil the water before drinking. Seeking to facilitate improved delivery of clean and potable water, the Indonesian Association of Water Enterprises (PERPAMSI) launched a pilot initiative known as the Certification and Training for Network Improvement Project (CATNIP). The CATNIP project aimed to make available clean drinking water to household consumers through their taps, and find ways for PDAMs to sustain the delivery of water. To accomplish this, small drinking water zones were set-up within PDAM service areas in order to develop models that would demonstrate the feasibility of drinking water provision.

In the process, the CATNIP project implemented three main activities: (1) provision of technical assistance and capacity building, (2) formulation of tools and procedures to institutionalize the pilot activities, and (3) establishment of a Certification Body to help ensure sustainability of the project. By design, the technical assistance, training and tools development components were complementary; they encompassed various technical, social, financial and institutional aspects, all of which were essential to establish and maintain the

INSIDE

drinking water zones. Working with three small zones in three different PDAMs (PDAM Kota Medan, PDAM Kota Bogor and PDAM Kota Malang) the pilot initiative incorporated intensive facilitation to secure commitment from participating PDAMs, and to introduce and integrate quality management concepts to PDAM personnel. To encourage sustainability, the project helped raise customer awareness of potable water availability in their homes, and it involved municipal policymakers during public outreach events. Finally, the project ensured that long-term institutions were in place to measure any successes and gather lessons learned by initiating the development of a multi-stakeholder certification body. This body was responsible for motivating replication by formally recognizing PDAMs that were successful in establishing drinking water quality zones.

The 11-month CATNIP initiative successfully facilitated the establishment of three small drinking water zones serving about 2,300 customers, and incorporated concepts of quality management to help PDAMs set up the zones. As well, PDAM staff benefited from integrated classroom and on-the-job training, exchanges and field visits, and direct facilitation on various topics ranging from detailed water treatment processes and proper laboratory procedures to enhanced communication strategies. As a result, the project enhanced the understanding and preparation of PDAM staff to effectively implement the production and distribution of potable water. While the certification body continues to be refined to encourage other PDAMs to participate, customers are directly reaping the benefits through better services delivery.

SITUATION BEFORE THE INITIATIVE BEGAN

In Indonesia, approximately 300 state-owned drinking water service providers (PDAMs) serve about 85 million people, or about 35% or urban dwellers. However, with a few exceptions, they provide only clean water that has to be boiled before it is used for cooking or drinking. Supply driven development policies of the past three decades focused primarily on the construction of numerous water treatment plants, with little regard for water pressure, water quality or piping system maintenance. At the same time, PDAMs continue to face political interference, financial burdens, and institutional troubles, preventing them from performing efficiently and effectively delivering adequate water services, and preventing most of them from charging full cost recovery tariffs. Consequently, the provision of drinking water through household taps remains illusive.

ESTABLISHMENT OF PRIORITIES

A 1998 survey conducted by the Ministry of Health revealed that only 60% of routinely sampled tap water passed the Indonesian bacteriological standards. Other findings included poor construction materials causing water leakages, and intermittent supply of water for less than 24 hours a day due to inadequate system pressure resulting in the seepage of bacteria into distribution systems and the reduction of residual chlorine. In systems where residual chlorine meets minimum standards, customers often complain about the chlorine taste.

In 2000, GTZ and the Ministry of Health collaborated to establish a drinking water quality zone in one small PDAM located in Northern Bali. The two institutions created and implemented strategies to sustain the exceptional water quality and help address user concerns of taste and odor. Building on this success, the Indonesian Association of Water Enterprises (PERPAMSI) partnered with USAID/US-AEP to

further develop a pilot activity to replicate the establishment of drinking water quality zones (also referred to as ZAMP - Indonesian for Prime Drinking Water Zone) within existing PDAM service areas. Known as the Certification and Training for Network Improvement Project (CATNIP), the pilot activity focused mainly on improving the quality of water delivered by PDAMs, by using various approaches to help institute quality management.

FORMULATION OF OBJECTIVES AND STRATEGIES

The CATNIP project aimed to ensure that drinking quality water would be readily available for household consumers, and from its inception sought to find ways for PDAMs to sustain the delivery of potable water. In order to reach its objective, the pilot program facilitated the implementation of three main strategies: (1) provision of technical assistance and capacity building, (2) formulation of tools and procedures to institutionalize the pilot activities, and (3) establishment of a Certification Body to help ensure sustainability of the project.

By design, the technical assistance, training, and tools development components were complementary and encompassed various technical, social, financial and institutional aspects, all of which were essential to establish and maintain ZAMPs. The CATNIP project also incorporated intensive facilitation to ensure commitment was secured from participating PDAMs, and that certain models were in place to measure any successes and gather lessons. The Certification Body initiation was included in the project to recognize those PDAMs that were successful in establishing the ZAMPs, and thus to motivate replication in other locations.

Three PDAM service areas in Kota Medan, Kota Bogor and Kota Malang were short-listed for the pilot after consultation with PERPAMSI and other sector practitioners. The pre-screening selection criteria considered a number of factors: (1) the operating capacity of the PDAM's and the number of consumers they reached; (2) their existing water distribution network; (3) their management systems; and (4) their orientation toward water quality improvement. Further discussions resulted in the selection of three small, distinct zones within these PDAM service areas: (1) Malibu in PDAM Kota Medan; (2) Pakuan Tajur in PDAM Kota Bogor; and (3) Pondok Blimbing Indah in PDAM Kota Malang.

MOBILIZATION OF RESOURCES

Preliminary drafting of the CATNIP design began in late 2002, following discussions by PERPAMSI, GTZ, the Ministry of Health, and USAID/US-AEP on the values of providing adequate and potable water through PDAMs. Further brainstorming to improve the design engaging other stakeholders, including: the Forum for Communication on Water Quality Management (FORKAMI), the Indonesian Society of Sanitary and Environmental Engineers (IATPI), and the Tirta Dharma Training and Education Foundation (YPTD).

At the time, USAID/US-AEP was partnering with PERPAMSI to implement several activities on building the capacities of PDAM operators and managers. Since PERPAMSI presented the natural entry point for further initiatives with PDAMs, particularly the CATNIP project, it was then agreed that USAID/US-AEP would provide support. From June 2003 until October 2004, USAID/US-AEP allocated a total of

$110,000 in grants for PERPAMSI to implement the project. The funding was utilized to conduct stakeholder consultations and field visits, and prepare and implement demand-responsive training on subjects crucial to establish a ZAMP. In addition, the assistance covered desk studies on installing new connections, reducing water losses, improving customer relations, etc. Finally, the funding supported the creation of tools to disseminate the ZAMP establishment process and activities, and the development of an information platform to store and manage the tools. In turn, PERPAMSI contributed in-kind inputs to coordinate various tasks and provided secretariat support.

PROCESS

The CATNIP project was officially launched in July 2003 with a road show to the three PDAMs by the CATNIP team, which consisted of PERPAMSI staff and two volunteer technical experts enlisted through the American Water Works Association (AWWA) by USAID/US-AEP. The initial visit was multi-purpose, intended to: (1) inform the PDAMs of the project and of the quality management model; (2) gauge interest and commitment from PDAM staff; and (3) help identify any operational and institutional weaknesses that could be addressed by the project. Initially, securing commitment from the PDAMs was a primary goal, and thus the AWWA experts provided key entry points by sharing their experiences about establishing potable water systems in the United States.

All PDAMs were aware of the quality management approach and noted their commitment to participate, but only one strived to attain the ISO standards for quality assurance and control. Feedback collected from the visits helped the team and the experts highlight the need to develop standard operating procedures for water production, distribution and quality monitoring; the strengthening of customer relations tools and strategies; and improving water quality monitoring.

In cooperation with the PDAMs, the team conducted a survey in August 2003 to profile the PDAM customer base and identify key information about customer service, water use, and willingness to participate in and pay more for improved services delivery. The survey was performed in six potential ZAMP areas. Survey results showed that customers in general were receptive to new methods and were willing to pay more if the delivery of water services was enhanced. Most customers conveyed that PDAMs did not perform enough outreach to inform customers of their performance and operating conditions. In addition to the survey, the team facilitated the creation of a localized CATNIP working group, ensuring that the group was well integrated into the existing PDAM management structure to avoid overlapping of responsibilities and to maintain a holistic approach.

Presented to the stakeholders in September 2003, the survey results were then used to select three small areas by consensus as the sites for the CATNIP implementation; each area was located within the boundaries of three short-listed PDAMs. At this presentation, the CATNIP team also detailed key prerequisites for each PDAM to attain a ZAMP status, noting especially that improvements were needed in the overall management models, human capital investments, and technical operations and maintenance of infrastructure. In particular, the team emphasized that sufficient outreach of the project internally within the PDAM staffs as well as externally to PDAM customers was essential.

Although initial commitment was expressed by the participating PDAMs, five months into the project *real action to follow through on those commitments* remained a challenge. For the CATNIP team, conveying

the understanding of the ZAMP, reaching out to the PDAMs and customers, and once again emphasizing the importance of quality management concepts were instrumental to realizing follow-through on these commitments. To help motivate concrete actions, a study tour of key PDAM personnel was organized to two locations where the ZAMP was already established and adequately sustained. Seeing real evidence of a ZAMP effectively encouraged the PDAMs to formulate work plans and follow through on associated action items. By the end of 2003, the PDAMs managed to allocate enough funding within their fiscal budgets to repair their distribution systems within the selected areas, and ultimately assigned the required technical and human resources. These were indicative of their commitments.

Nevertheless, continuous support remained important. In discussions with PDAM directors, managers and operators, the team reintroduced the quality management concept with respect to treated water production, distribution, monitoring, and public/customer outreach. Service targets were formulated to link potable water availability with quality. Manuals and guidelines to demonstrate how a ZAMP was established were developed. The team also supported the PDAM staff with the creation of standard operating procedures (SOPs) to ensure adequate production, distribution, and monitoring of drinking water in their local contexts. In at least five visits to each area, the team continued to inform PDAM staff and customers about the ZAMP, and delivered training on strategies and ways to prepare communication and public outreach tools, to carry out a customer satisfaction surveys, and to analyze tariffs. Lastly, the team continued to monitor progress on the repairs and installation of pipes, water meters, and other equipment to make sure that all actions needed to establish a ZAMP were implemented.

The certification process to validate ZAMPs and measure their achievements began in parallel with the ZAMP area selection and establishment efforts. The idea was to initiate discussions to quantify improvements being made by the PDAM and to certify PDAMs that have successfully instituted ZAMPs. From December 2003 until August 2004, stakeholders including government, NGOs, consumer groups, industry associations, and university representatives participated in three consultations to assist with creating a framework for a certification system that corresponded to the ISO standards, and dealt directly and only with the delivery of potable water instituted by PDAMs. The meetings resulted in the creation of a multi-stakeholder working group tasked to help define the scope of certification, establish a Certification Body, determine the roles and responsibilities of the Body personnel, and finally to establish standards for certification. The group proposed to set up the Body jointly by PERPAMSI and the Ministry of Health, but the proposal remained pending.

RESULTS ACHIEVED

By the end of the 11-month program in September 2004, three drinking water zones were established. Now about 2,300 customers are able to drink water from their household taps. The program therefore had effectively introduced the concept of quality management and successfully supported the PDAMs to establish ZAMPs. More importantly, technical assistance provided through the program enabled the participating PDAM staff to better understand the conditions required for the production and distribution of potable water. By design, the assistance integrated classroom and on-the-job training, exchanges and field visits, and direct facilitation for PDAM personnel on various factors essential in maintaining potable water quality, from detailed water treatment processes and proper laboratory procedures to enhanced communication strategies.

In the CATNIP project, preparation of SOPs and guidelines catered to the different needs of PDAM managers and operators, for example, addressing improved public relations, and highlighted the key processes and strategies for establishing a ZAMP for replication by other interested PDAMs. In addition, the program helped develop public outreach tools for PDAM personnel to conduct customer satisfaction surveys and disseminate the CATNIP approaches for possible replication. Aspects of full cost recovery, tariff analysis and staff professionalism were integrated into all discussions and training events. As a result, PDAM staffs and managers are better equipped to provide exemplary services to their customers.

Finally, customers became more aware of the improvements in their water quality and in the services provided by their respective PDAMs. Satisfaction surveys of customers residing in the pilot areas were conducted three months after project implementation. The surveys revealed that 79% of the customers noted the improved water quality and understood that the water supply was potable, although most continued to boil water before drinking out of habit. For PDAM Kota Bogor, 52% of the survey respondents detected better public relations practices by PDAM staffs in responding to complaints and problems. A marked improvement in water services delivery, including greater emphasis on customer orientation was achieved through the project.

SUSTAINABILITY

Having drinking quality water delivered to the household tap is a rare feat, although many PDAMs are already beginning to improve their services. In order to ensure sustainability, the CATNIP project addressed two key measures:

(1) **Certification Body**: The formation of a Certification Body to help quantify and certify the improvements under the auspices of PERPAMSI and the Ministry of Health. Initial discussions to establish the Body were initiated and they involved broad stakeholders from the national and local governments, PDAM staffs, consumer protection organizations, and water sector groups and practitioners. At the end of the project, a multi-stakeholder working group mandated to further develop the Body was successfully established. Subsequent efforts by the group yielded the draft internal management procedures and formulation of scope, performance standards, and checklists for certification. In the meantime, full accreditation of the Body by the National Competency Committee remains in discussion. It is intended that formalization of the Certification Body to recognize those PDAMs that have successfully established the ZAMPs will generate enough demand from other water service providers for certification and therefore encourage their interest for long-term improvements in delivering water.

(2) **Participation and Accountability**: Another effort performed during the project was to involve local policymakers, consumers and the general public during the ZAMP establishment process as a means to promote accountability. For instance, the CATNIP team coordinated with PDAM staffs to ensure that the mayors and legislators in Bogor and Malang took part in the public inauguration of the ZAMPs in their respective municipalities. In addition, the CATNIP team also worked with the PDAM personnel to create communication and public outreach tools to understand better the perception of the different stakeholders and clarify the ZAMP concept. Marketing techniques on the ZAMP, water

conservation and quality aspects were employed and produced through different media and methods, such as brochures, home visits, information booklets, satisfaction surveys, and TV.

In collaboration with PDAM staffs, the CATNIP team developed and implemented customer satisfaction surveys to identify customer behavior, consumption patterns, perception, and the readiness and willingness to accept improved PDAM services. By involving the public and local governments during implementation, greater accountability of PDAM performance can be readily monitored, and thus sustainability of the ZAMP can be better assured.

LESSONS LEARNED

Key lessons learned during that helped to ensure the program was implemented effectively are as follows:

Building commitment of PDAM personnel and other stakeholders was an essential prerequisite. To get a proper buy-in on the feasibility of establishing a ZAMP, the CATNIP team remained resilient and interacted continuously with the various PDAM directors, managers and staffs. At first, nearly all PDAM managers noted that forming a ZAMP was impossible due to lack of readiness among the staff, lack of willingness from the customers to accept change and their perceived skepticism, and possible tariff increases associated with investments for improved water services. To overcome these barriers and secure commitment, the CATNIP team employed different tactics. To demonstrate the real possibility of establishing a ZAMP, the team coordinated study tours to other PDAMs that have successfully achieved the ZAMP status and invited international resource persons to share their knowledge and experiences. In addition, the team conducted awareness campaigns and surveys, both formally and informally, with PDAM personnel and the customers in the targeted zones. Results from these efforts helped to unify the perception of the various PDAM staff and to understand the PDAM customers better. By providing evidence and building confidence from the customers and PDAM staffs, the team was able to convince and secure commitment from the PDAM directors and managers.

Involving various stakeholders during the program's design and implementation process was an important element to gain support. In the inception stage, PERPAMSI invited government and select donor agencies to participate in developing the CATNIP's scope and then involved NGOs, sector practitioners, consumer groups and academia to refine the project design. The participation of these stakeholders in the planning process subsequently proved fruitful during the Certification Body formation, in which support to formalize the Body was readily secured. In the start-up process, the same participatory principles were used to have PDAMs interested in the program select the most applicable service areas based on discussions and on the results of a preliminary customer profile survey.

During implementation, the CATNIP team engaged PDAM staffs to familiarize with the program and facilitated the preparation of their own guidelines and SOPs. In other words, these tools were made based on real application and field conditions, and more importantly, by the involved PDAM staffs themselves instead of external consultants. Finally, public outreach about the program targeted not only to PDAM staffs but also customers living in the program areas. This multi-stakeholder participation model proved crucial to build ownership of the project from the participating PDAMs, to and to gain customer confidence and openness of new initiatives aimed at improving services delivery.

Preserving an integrated approach was essential to improve water quality management and provision. By design, the project addressed technical, social, financial and institutional aspects that were fundamental to establish a ZAMP. First, the program incorporated technical training sessions on the topics of, among others, basic water treatment engineering, methods to reduce physical leakages and clean existing pipes, installation of water quality monitoring units, and establishment of standard laboratory practices and QA/QC procedures. Second, the program emphasized the need for greater customer orientation and communication, and helped develop tools to implement such activities. Third, aspects of cost recovery and tariff analysis were included in several discussions and meetings with PDAM personnel as an exclusive topic for financial stability. Fourth, improved quality management approaches modeled after standard industry practices such as ISO 9000 and Total Quality Management were introduced to strengthen the PDAM institution. As such, the project intentionally integrated with existing PDAM initiatives and institutional functions, such as involving current PDAM staffs to become the person-in-charge for facilitating the development of SOPs and guidelines. Taken as a whole, the integrated approach helped build the capacity of PDAMs to understand the quality management model and apply it to sustain the provision of drinking quality water to their customers.

TRANSFERABILITY

In collaboration with PERPAMSI, the CATNIP project supported the development of an information platform to collect lessons and experiences gained from the process of establishing the three drinking water quality areas, and from other activities performed in cooperation with various external supporting agencies. PERPAMSI also created a website to serve as the information help desk and platform for PDAM service performance improvements as well as to present to the general public and donor agencies the working mechanisms of PERPAMSI. The plan was to incorporate the lessons from the program in the website, once a monitoring and evaluation activity had taken place to synthesize best practices. PDAMs interested in acquiring information on the CATNIP project and its implementation process can refer to the website or liaise with PERPAMSI. Although the website had evolved to date to include, among others, the PDAM benchmarking information and national/international news and events on water and sanitation, posting of the results from the program remained pending.

A Water Advisory and Services Center is currently being formed with the assistance of GTZ and a Dutch Trust Fund to reside in PERPAMSI. The Center would more or less function as the clearinghouse for all associated activities conducted by PERPAMSI and YPTD in the past and present. As an alternative to the website, it is hoped that results from the CATNIP project would also be included in the information center and thus provide a starting point for other PDAMs willing to replicate and apply the program's processes. To complement the documentation of the program's implementation, the three successful PDAMs have agreed to participate as models and to share their experiences. As mentors, they will provide the expertise and know-how to initiate the ZAMP establishment process. While these information platforms are useful to help disseminate the results and best approaches of the CATNIP project, PERPAMSI, with support from other agencies, wil need to reinitiate discussions with other PDAMs in order to generate demand for replication.

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CASE STUDY
Greater Savings, Cleaner Air

Green initiatives reduce pollution and improve the bottom line

Photo: Jeff Mijares, Central Azucarera Don Pedro
Workers from Luntiang Nasugbu Multipurpose Cooperative produce fertilizer at the CADP composting facility.

"The benefits of good environmental management are enormous," said CADP's Jeff Mijares. "You change the way you do things and, along the way, you change attitudes."

Challenge

Population growth, urbanization and industrialization have created enormous pressures on the environment and life support systems upon which all Filipinos depend. Air pollution from vehicles and industry is a major public health concern. Nearly 2.5 million tons of hazardous waste is generated each year, and only forty percent of solid waste is collected while the rest is dumped into waterways and open spaces. Although major legislation on clean air, solid waste, and clean water has been passed, enforcement remains a challenge. Under these conditions, voluntary private initiatives are often the most effective way to reduce pollution and conserve energy.

Initiative

"Greening the supply chain" is a process by which buyer companies impose environmental performance requirements on their manufacturing partners and vendors. USAID has encouraged this process, supporting five two-day workshops for more than 100 participants from 49 businesses. To sustain the initiative, all participating businesses were invited to attend a full-day environmental forum each quarter. More training and mentoring was provided by the Philippine Business for Social Progress, bringing the total number of companies participating in the program to 300.

Results

Dozens of companies have improved their environmental practices and performance, including Central Azucarera de Don Pedro (CADP) in Nasugbu, Batangas. The largest producer of raw sugar in the country, CADP responded to USAID's initiative by sponsoring a composting facility that is generating jobs, skills and income for the community. The facility processes most of CADP's organic waste and will soon expand to accept municipal waste. CADP's adoption of energy conservation and efficiency measures have given it preferred procurement status from partner, Nestlé. This move has resulted in an annual company savings of more than 33 million pesos ($600,000), providing dramatic proof of how improved environmental operating procedures can benefit corporate bottom lines.

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CASE STUDY
Improving Air Quality and Livelihoods

Program reduces air pollution and empowers drivers

Photo: Bobby Ocampo, Puerto Princesa City

Tricycle drivers support the clean air program in Puerto Princesa, Philippines.

Drivers say they are performing more regular engine maintenance, resulting in significantly reduced emissions.

Challenge

Puerto Princesa, capital of the Philippine island province of Palawan, is a city of enormous natural beauty, including crystalline seas, lush mountains and a largely unspoiled coastline. It is also a city with an air pollution problem, much of it caused by the omnipresent three-wheeled taxis ("tricycles") and their two-stroke engines belching exhaust that contains high level of fine particles and other harmful pollutants. City leaders and citizens alike want to clean up the air and develop a sustainable tourism industry without causing economic hardship for the roughly 4,000 tricycle operators; Puerto Princesa's poverty rate is 70 percent and many people depend on tricycles for their livelihoods.

Initiative

USAID helped create an initiative that partners tricycle drivers, youth groups and local leaders to work to reduce air pollution. With support from USAID, motorcycle manufacturers conducted maintenance workshops for each of the 20 tricycle driver associations. USAID helped drivers access low-cost loans so they could upgrade to cleaner engines and conducted an information campaign on the adverse health effects of polluting engines on drivers and their passengers. Tricycle drivers have embraced the clean air program, formed a cooperative and are working with the municipality on a new traffic management system that limits the number of tricycles on the road.

Results

Four months into the program, tricycle emissions had been significantly reduced: hydrocarbons by 40 percent and carbon monoxide by 30 percent. Drivers say they are performing more regular engine maintenance, including properly tuning engines and using oil correctly. Under the new traffic management system, drivers work half as many hours, but earn the same income and said they used the extra time to find additional work and spend time with their families.

Nationwide Drive Improves Waste Management

Photo: Jun Elias

Mayor of San Fernando, Philippines leads fight against garbage.

"The study tour opened my eyes to the potential of good environmental management. San Fernando's environmental programs contribute to sustainable development - visitors come to see them and spend money, and citizens see the benefits and are proud."

- Mary Jane Ortega, Mayor of San Fernando, Philippines

Since 1998, USAID's United States-Asia Environmental Partnership (US-AEP) program has assisted the small northern Philippine city of San Fernando on environmental practices. US-AEP's on-going support of Mayor Mary Jane Ortega's solid waste initiatives has allowed the city of San Fernando to become a model for other local governments throughout the country – 19,000 people have visited the city to learn about its environmental programs.

Mayor Ortega went on a study tour to the United States to learn about local government's role in solid waste management. She returned home and created the Solid Waste Management Association of the Philippines (SWAPP), the first of its kind in Asia. As President of SWAPP, she assisted 100 local government in developing waste management plans to comply with the country's Ecological Solid Waste Management Act. In 2001, Ortega secured a $1.3 million World Bank loan to convert San Fernando's dumpsite into an engineered sanitary landfill modeled after those she saw on her USAID study tour in the United States.

When completed, the facility will become the fourth sanitary landfill in the Philippines. The landfill currently employs forty-six workers at $3.60 per day through an innovative recycling program that has reduced the amount of waste processed daily by 15%. These results have fueled the development of a thriving recycling industry which has grown to fourteen dealers. One community, Barangay Lingsat, installed its own recycling facility to reduce community waste and now earns $360 per month by selling recyclables.

First Person

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Puerto Princesa's Clean Air Program

A BEST PRACTICES CASE STUDY: THE PHILIPPINES

SUMMARY

The local government of Puerto Princesa City, in collaboration with the private sector, media, civil society organizations, and academic institutions, initiated the City's clean air program to achieve the following objectives: (a) to reduce hydrocarbon and carbon monoxide emissions from tricycles or three wheelers; (b) to effectively implement the Philippine Clean Air Act at the local level; (c) to reduce traffic congestion along major city transport routes; and (d) to improve air quality in the city.

At the core of the this program was the introduction of the "50/50 scheme" designed to reduce the volume of tricycles or three wheeler taxis plying the city streets by 50%. This plan was complemented by public awareness campaigns, roadside inspections, and the promotion of proper vehicular maintenance among drivers to reduce harmful emissions.

The program initially focused on tricycles numbering about 4000 throughout the city. The introduction of the 50/50 scheme has significantly reduced vehicular traffic congestion in the main thoroughfares, resulting in significant reduction in harmful gas emissions. Through their own organizations, tricycle drivers plying the city streets have gone through a four-month training module on proper maintenance, resulting in at least a 40% reduction in the emission of hydrocarbons and a 30% reduction in carbon monoxide emissions. The

INSIDE

program is being scaled up to address all mobile and stationary sources of air pollution as the city council has recently passed a local ordinance institutionalizing the implementation of the Clean Air Act at the local level. To be led by the City Environment and Natural Resources Office, the City Clean Air Management Board (CAMB), represented by various stakeholders from the public and private sectors as well as the civil society and academe, will implement the ordinance.

SITUATION BEFORE THE INITIATIVE BEGAN

Air quality monitoring efforts performed by the Department of Environment and Natural Resources (DENR) indicated that air quality in Puerto Princesa, the capital city and economic center of Palawan, ranged from "good to fair." Nevertheless, there were observations that ambient air quality in certain areas was deteriorating due to the increasing number of smoke belching tricycles clogging the city streets during the rush hour. If not addressed, there were fears that tricycle traffic congestion (particularly along Malvar and Rizal streets) could have a serious impact on the health of city residents as well as on the city's tourism-driven economy.

ESTABLISHMENT OF PRIORITIES

Puerto Princesa's clean air program prioritized the reduction of emissions from tricycles. When Mayor Hagedorn declared his commitment to initiate a clean air program in Puerto Princesa during his participation in the Bangkok study tour, it was clear to him that the program would have to start with addressing tricycle pollution as these vehicles account for 60 percent of the city's vehicles and constitute the principal means of transport for the city's 253,000 residents. It was a decision that was validated through extensive stakeholder consultations following his Bangkok trip. Through the passage of the City Ordinance Number 258, the program is being scaled up to cover four wheelers as well as stationary sources such as commercial and industrial establishments.

FORMULATION OF OBJECTIVES AND STRATEGIES

Puerto Princesa's clean air program aims to achieve the following objectives: (a) to reduce hydrocarbon and carbon monoxide emissions from tricycles by 25 percent in 2005 and 50 percent in 2007; (b) to effectively implement the Clean Air Act of the Philippines at the local level; (c) to reduce traffic congestion in the city's major thoroughfares; and (d) to address the adverse effects of air pollution in the city. These objectives are to be achieved through a five-point strategy including inspection and maintenance; improved traffic management and infrastructure development; a financing scheme for cleaner tricycle engines (e.g. buy-back scheme for old tricycles, shift to four-stroke engines); a public awareness program; and the promotion of alternative livelihood among tricycle drivers. The program initially took off on tricycle traffic volume reduction schemes (i.e. one-day rest period and the 50:50 scheme). However, after extensive consultations and technical inputs from US-AEP, a consensus emerged that that the program would achieve better results by adopting a more comprehensive approach using the five strategies.

MOBILIZATION OF RESOURCES

After the Bangkok study tour, Mayor Hagedorn requested technical assistance from US-AEP to kick off the city's clean air program. In response, US-AEP hired an air quality management expert, Mike Walsh, in February 2004 to assist the city in developing an initial action plan. As part of the Walsh report, the Mayor organized a Core Group led by the City Planning and Development Office to start working on the program. Besides the city planning office, the core group is composed of the City Legal Office (for legislation); the City Environment and Natural Resources Office (for inspection and maintenance); and the traffic management group (traffic management). The mayor also invited the participation of non-government organizations including the Environmental Legal Assistance Center to assist the city in formulating a draft ordinance and the TagBalay Foundation (an environmental organization) for public awareness campaigns. TagBalay Foundation's public awareness campaigns were financed largely through a P300,000 grant from US-AEP. Likewise, extensive stakeholder consultations in the drafting of City Ordinance No. 278 were financed by a P900,000 US-AEP grant administered by The Asia Foundation. Recently, the Asian Development Bank (ADB) approved a $260,000 grant that the city will use to develop alternative livelihood projects for tricycle drivers and their families.

PROCESS

Under the 50/50 scheme, tricycles with a number "1" sticker are allowed to operate only on Monday, Wednesday, and Friday and Sunday. Those with number "2" are allowed to operate on Tuesday, Thursday, Saturday, and Sunday. Fearing a decline in income, tricycle drivers and operators opposed the 50/50 scheme when the core group raised the idea in a public consultation in early March 2004. Tricycle drivers numbering about 4,000 (3,000 registered and 1,000 unregistered) are an influential group, representing at least a solid 12,000 potential votes. The May 10 election was coming and some city officials feared that, when not handled properly, an environmentally beneficial initiative could have a serious political backlash. As a compromise, the core group proposed that a two-week experiment be held to determine the proposed measure's impact. The tricycle drivers and operators agreed, with the caveat that the scheme be discontinued once proven to yield negative results.

After a day, drivers/operators observed that the scheme had doubled their day's income from an average of P400 to P800. Incomes of drivers who operate tricycles on "boundary basis" rose from P250 to P500. This means that in a week, the drivers have actually maintained their weekly income despite operating only for four days. The losers were the operators comprising 10 percent of the total number, as they only collect "boundary pay" thrice a week. Some commuters also complained of the limited availability of tricycles resulting in longer waiting time. Overall, the response from the general public was generally positive. After another series of consultations, the tricycle drivers and operators agreed to the 50/50 scheme provided that the local government would explore possible alternative livelihood opportunities for their families to lessen their economic dependence on the tricycles. To address commuters' concerns regarding longer commuting time, the city government raised the franchise cap to 4,000 by giving franchises to the 1,000 unregistered tricycles with the understanding that the said cap will remain unchanged in the next ten years. Having obtained the consensus, the city council passed City Ordinance No. 271 on November 30, 2004 formally adopting the 50/50 scheme.

The proposed phase-out of two-stroke engines in favor of four-strokes was a very controversial issue during the stakeholder consultations on City Ordinance No. 278. Almost six of ten tricycle-operators in Puerto Princesa favored two-strokes because they are lighter, more powerful, and less expensive

compared to four-strokes. However, two-strokes are known to produce more pollutants because of the combustion of oil mixed with gasoline as well as the leakage of some fuel each time a new charge of air-fuel mixture is loaded in its combustion chamber. Sensing a stalemate, the Core Group instead reworded the provision stressing that the program will not ban two strokes but "encourage" the shift to four-stroke engines or "or other more efficient technology" within the next four years. This goes along with the observation that two stroke engines could actually meet current emission standards (i.e., ECE 40.01) under Clean Air Act, given adequate and proper maintenance. Also, the Core Group members think that emerging cleaner technologies (e.g., hybrid and electric engines, compressed natural gas, ethanol, among others) could render the current two-strokes-versus-four-strokes debate moot and academic.

RESULTS ACHIEVED

Traffic congestion and gridlock, particularly in major thoroughfares is now a thing of the past as a result of the 50/50 scheme. This is particularly observable in Malvar, Rizal, Fernandez, Valencia, San Pedro Streets, as well as the national highway going the city's central business district. The City Environment and Natural Resources Office is currently in the process of measuring the 50/50 scheme's impact on the city's ambient air quality. The results of these monitoring efforts are not yet available but environment officials claim the scheme may have reduced emissions of hydrocarbon and carbon monoxide by at least 50 percent, with only half the city's tricycle fleet plying the streets. Furthermore, maintenance activities conducted by tricycle federations as part of the four-module maintenance program have been shown to have reduced hydrocarbon and carbon monoxide emissions by 40 percent and 30 percent, respectively. Despite operating only for three to four days, tricycle drivers have maintained their average weekly income. The three-day break enabled them to have more time for maintenance activities as well as quality time for their families. In random interviews, drivers claim improved health conditions because of the three-day rest and less air pollution. They say that before the 50/50 scheme, they used to go home too exhausted even to partake of the family dinner. These days, they say they usually reach home still energetic enough to play with their children and help in household activities.

SUSTAINABILITY

With the passage of the City Ordinance No. 278, the Core Group feels the sustainability of the program is now assured. The ordinance mandated the creation of the City Air Management Board (CAMB) that will implement the city's clean air program covering both mobile and stationary emission sources. Both sources will have to strictly comply with the emission standards set by the Clean Air Act. Even smoking in public places will not be permitted. The city government is also mandated to promote the use of bicycles by establishing bicycle lanes within the city limits. Program components such as inspection and maintenance, as well as information and education campaigns, are now institutionalized.

The city ordinance provides that the city government, through the mayor's office, will allocate P3.5 million each year for the clean air program. This appropriation will be augmented by a trust fund that will be established through the collection of fees from motor vehicle owners and operators during routine testing. Fines and penalties imposed upon violators as well as owners whose vehicles failed to pass the standards will also form part of the trust fund. Effective stakeholder participation is also

ensured with the inclusion of the private sector, civil society groups, academic institutions, barangay chairpersons in the CAMB.

Members of the core group stress that greater awareness by the general public regarding the importance of clean air will also help ensure the sustainability of the program. Since the start of the clean air program, environmental groups like the TagBalay Foundation have been conducting public awareness campaigns using tri-media (radio, television, and print). The Foundation also has conducted teachers' training workshops on the ill effects of air and noise pollution and has prepared a training module to be incorporated into the local school curriculum. This is to ensure that the young who are the future leaders of the community will internalize the importance of maintaining a clean environment.

LESSONS LEARNED

At least four important lessons could be gleaned from the success of Puerto Princesa's Clean Air Program.

First, broader stakeholder participation and dialogue is crucial. Tricycle drivers and their organizations were highly critical of the program at the start, fearing economic dislocation. But through extensive consultations and exchange, issues and recommendations (e.g., economic impact of traffic volume reduction, alternative livelihood opportunities, health impacts) were clarified. Eventually a consensus to forge ahead with the program emerged.

Second, the political will and skill of the city's political leadership is important. The 50/50 scheme was launched a month before the May election. A misstep could have generated a serious political backlash. A less courageous politician could have waited for the election season to pass before initiating what is initially perceived as a painful policy measure. But Mayor Hagedorn did push through with the program using the two-week 50/50 experiment as a way to gauge the impact of the program and reach out to its critics. And when the positive initial results surfaced, he pressed ahead to achieve consensus by personally conducting extensive dialogues with tricycle drivers and other stakeholders.

Third, active participation by civil society groups (e.g. TagBalay Foundation, ELAC) helps in enhance community ownership of the program. Palawan has a relatively good network of nongovernmental organizations with good track records in environmental protection and conservation initiatives. This close coordination with civil society groups and local government institutions enhanced the credibility of the clean air program, making it easy to "sell" to stakeholders and the general public. Civil society participation also enabled the program to tap technical assistance and grants that sped up the implementation of some its components (e.g. public awareness campaign and legislation).

And fourth, the clean air program was launched in a social context that is relatively well prepared for such an environment-oriented program. Puerto Princesa is one of the cleanest cities in the country owing to its successful clean and green program. The city has a track record for successful environmental projects such as the sanitary landfill, forest protection, and mangrove rehabilitation. Initiating measures intended to clean the air therefore is not expected to encounter stiff resistance from the general public.

TRANSFERABILITY

The League and Cities of the Philippines have recently created an environment unit to explore the possibility of replicating Puerto Princesa's Clean Air Program in at least 10 percent of cities nationwide. So far, three cities (San Fernando in La Union, Mandaue in Cebu Province, and Calbayog in Samar) are in various stages in implementing components of Puerto Princesa's clean air program.

San Fernando's vehicle reduction program comprises the following components: the conversion of two-strokes to four-strokes tricycles; financial assistance for drivers and operators who are shifting from two strokes to four-strokes; regular air quality monitoring; continuous information dissemination campaign; the four-module maintenance training through USA-EP; loans and grants to tricycle cooperatives, and annual sputum test for tricycle drivers.

In Mandaue City, the main sources of harmful emissions are stationary, such as factories and commercial establishments. Nevertheless, the City has adopted the four-module tricycle maintenance program as a way to kick-start its own clean air program. This module aims to train tricycle drivers and operators in the proper maintenance practices for both two-stroke and four-stroke engines. Specifically, drivers and operators are being trained on how to clean spark plugs and air filters, and properly use lubricants. In the past, many drivers removed silencers and air filters to enhance the power of their two stroke engines; The module addresses these issues by stressing that these practices could actually hasten engine wear and tear through the introduction of dirt and fine particles, increase hydrocarbon and carbon monoxide emissions, and reduce engine efficiency.

Calbayog's fleet of motorcycles and tricycles is growing by 50% each year, and the Mayor is looking at Puerto Princesa's clean air program, particularly its traffic management scheme, as way to prevent traffic congestion.

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FROM THE AMERICAN PEOPLE

CASE STUDY
100 Days to Cleaner Air

Government action results in a 90 percent drop in ambient air lead levels

Photo: USAID

A research team monitors pollution from vehicles in Colombo, Sri Lanka.

"USAID has provided a remarkable amount of resources and global experiences through training," says Secretary Don S. Jayaweera, Ministry of Transport. "This program accomplished several important achievements through hard work and setting ambitious targets to attain better air quality."

Challenge

By 2001, the air quality in Sri Lanka's major cities was deteriorating rapidly — largely due to pollution from vehicles using leaded gasoline. Even at low levels, lead exposure can affect brain development, reduce learning ability and cause behavioral disorders, especially in children. However, lead poisoning is also entirely preventable, and eliminating the use of leaded gasoline is a critical first step to reducing exposure on a wide scale. In June 2002, the Sri Lankan government launched the 100 Days Program, halting sales of leaded fuel countrywide. But it needed to provide evidence to policymakers and the public that the program would be effective and beneficial to keep up the momentum for additional measures to improve air quality.

Initiative

To support the 100 Days Program, USAID sponsored several initiatives, including one study measuring the impact of the lead phase out, and another identifying the country's most polluting vehicles using state-of-the-art remote sensing technology. USAID also assisted the World Bank and the Ministry of Environment and Natural Resources in forming the Air Quality Management Center, which carries out nationwide emissions and fuel standards programs and implements campaigns to increase environmental awareness and communicate with the public.

Results

Ambient air lead levels dropped 90 percent as a result of the 100 Days Program. Buoyed by these results and its increased capacity to manage air quality, the Sri Lankan government is committed to taking further actions — mandating better vehicle maintenance practices, instituting a vehicle testing program and changing the policies on importing used and two-stroke vehicles. With the help of the Air Quality Management Center, proposed standards for emissions and inspections have now been crafted that will enable Sri Lanka to meet more stringent vehicle emission standards for both imported and in-use vehicles by 2007.

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CASE STUDY
Generating Biogas from Wastewater

A scientist uses products of the manufacturing process to save energy

Photo: Kim Mihalik, Louis Berger Group

Dr. Chad Kanagachandran holds a bag of biogas from the pilot plant.

"USAID support… gave me the opportunity to learn about anaerobic wastewater treatment systems in distilleries, and helped me to design the process for breweries to treat a combination of wastewater and spent grain," said Dr. Kanagachanran.

Challenge

The Lion Brewery Limited is among the leading breweries of Sri Lanka, manufacturing its brand-name beer and holding a franchise to produce Carlsberg beer. The facilities are located along the Kelani River, the major source of drinking water for the capital Colombo and roughly three million people living in the greater metropolitan area. To ensure the health of these downstream users, proper disposal of wastewater is critical. The company is paying high energy costs to operate its wastewater treatment system at European standards. Disposing of wastewater containing spent grain and other byproducts to meet these standards was a major challenge.

Initiative

Two years ago, Dr. Chad Kanagachandran, the brewery's special projects manager, began investigating the concept of producing a bio-fuel from the products of the manufacturing process. USAID sponsored Dr. Kanagachandran on a technical visit to India to learn about the technology used by Lars Enviro Private Ltd, a subsidiary of the U.S.-based Larson Engineering. On his return Dr. Kanagachandran helped Lion Brewery develop a pilot system that combines spent grain with untreated wastewater. This "wastewater tea" is then sent to an anaerobic treatment tank where microbes consume the waste in the water and produce methane fuel — creating a win-win situation for the company and the environment.

Results

The pilot test converted about 1 percent of Lion Brewery's total waste into a fuel source. Due to the success of the test, the brewery is implementing a larger application to optimize the process and generate the data needed to prepare for full-scale application at the facility. The system will reduce the amount of solid waste generated by the plant, decreasing the volume of spent grain by up to 40 percent. Lion Brewery also expects that the new development could cut energy costs by a third — saving approximately $80,000 a year.

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SUCCESS STORY
Turning Waste into Profits and Jobs

Composting reduces Colombo's garbage by more than 1.3 million pounds a day

Photo: USAID/Ananda Mallawatantri

A state-of-the-art system turns Colombo's mountains of garbage into compost, easing the capital's waste disposal problem.

"I am extremely proud that Sri Lanka has the largest factory producing compost in South East Asia. This environment-friendly project became a success largely due to the support from USAID," says Burns Environmental Technologies general manager Sumith Jayawardena.

The residents of Sri Lanka's capital, Colombo, discard more than 1.6 million pounds of garbage every day. The local government struggled for years to find a suitable new sanitary landfill site, but after several failed attempts the city resorted to sending its solid waste to Bloemendhal — a "temporary" landfill that is now filled past capacity but has no plans to close.

USAID suggested a different approach: reducing the amount of waste sent to Bloemendhal by establishing a more efficient composting process for the city. In 2002, USAID and its partners studied the composting process at the Burns Environmental Technologies facility, recommended several modifications and identified the equipment that would be needed to make good quality compost. USAID also trained local staff to test the compost and coordinated a meeting among the Department of Agriculture and research institutions representing tea, rubber, coconut, and other export crops to ensure that the compost would be accepted by local markets. Using this input, the government finalized national standards for compost in 2004.

Today, most of the solid waste in Colombo is composted, generating more than 130 tons of marketable compost a day, and reducing the amount of waste disposed of at Bloemendhal by more than 80 percent. The city of Colombo has reduced its solid waste contribution to the Bloemendhal site by nearly 400,000 tons over the last two years, generated 200 jobs for the community and established a source of quality nutrients for Sri Lanka's agricultural needs.

With this initiative on its way to solving Colombo's solid waste problems, plans are now being made to replicate this success by establishing eight composting facilities in other urban areas, including Galle, Kurunegala, Anuradhapura and Trincomalee. The profitability of exporting the compost product to the Maldives and several Middle Eastern countries is also being evaluated.

USAID | THAILAND
FROM THE AMERICAN PEOPLE

CASE STUDY
Renewable Energy Boosts Economy

New regulations allow small energy generators to sell excess electricity to national utilities

Photo: Chris Greacen, Palang Thai

Small-scale producers in Thailand are tapping alternative energy sources, including water, to reduce air pollution and decrease the country's reliance on energy imports.

"Our outreach efforts have led to at least 3 MW of additional planned installations in Thailand — enough electricity for 12,000 homes," says Palang Thai's Chris Greacen. "USAID's support throughout has been essential to our efforts."

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Challenge

Thailand currently relies on imports, mainly crude oil, to satisfy about half of its energy needs. With a view to reducing pollution and strengthening energy security and competitiveness, the country is increasingly exploring ways to meet growing consumer and industrial needs with domestic renewable resources. Water, solar, wind, biomass and biogas generation are economically viable and could meet more than a tenth of Thailand's demand. Adopting these technologies, however, has been limited by various obstacles, including a lack of support for small-scale renewable energy producers, who were not allowed to sell electricity to utilities due to concerns about safety and compatibility.

Initiative

With assistance from USAID, a group of volunteers drafted legislation in 2002 to allow small community- or entrepreneur-owned renewable energy generators to connect to the grid and sell excess electricity to utilities. Due in part to dialogue sparked by a USAID-sponsored study tour to the United States and training course in Bangkok for government representatives, the new regulations were approved later that year. USAID helped supply expertise and guidance through a partnership with California-based utilities with substantial experience in small-scale renewable energy. USAID also supported the organization Palang Thai in ensuring smooth implementation of the new regulations by supplying energy experts to work with the government on policy, and helping small-scale generators resolve technical and contractual barriers.

Results

The new legislation has encouraged the development of clean energy resources while improving Thailand's environment, building local economies and reducing reliance on imported fuels. Eight small-scale generators have started to sell power to the national grid, while more than 40 others, with a combined generating capacity of over 6 MW, have been given permission to connect to it. With this steady increase in renewable energy sources coming on line, the Thai government is now expanding the regulations to include larger renewable energy generators that can produce up to 5 MW.

USAID | ASIA
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CityLinks

A BEST PRACTICES CASE STUDY: THAILAND

SUMMARY

Environmental management is a major challenge facing municipalities in Thailand. As of 2005, all Thai cities had developed five-year plans for environmental management, as required by the central Thai government; however, many cities remained ill-prepared to meet the 2006 implementation deadline. Their plans needed adequate financial resources, defined priorities, implementation schedules, and programs for public involvement. Overcoming the many environmental issues – urban water supply, wastewater treatment, and solid waste disposal – presented onerous challenges.

To help address these issues, the cities of Chiang Mai, Khon Kaen, Phuket, and Portland, Oregon entered into a two-year CityLinks partnership in 2003.

The Partnership had three central objectives: (1) to strengthen municipal environmental management; (2) to improve public service delivery; and (3) to encourage democratic participation from citizens in environmental management. To accomplish these objectives, the initiative promoted downtown redevelopment and sought to improve environmental protection measures through new financial management measures (e.g. increasing fees for wastewater services).

INSIDE

During an initial trip to Portland, representatives from the three Thai cities learned about Portland's financial planning processes, redevelopment projects, and action plan development process. After this trip, a delegation from Portland visited Thailand to review the progress of project planning and implementation, and to provide guidance and support. The Thai delegates returned to Portland in mid-2004 to discuss and revise their action plans and learn about public participation tools and methods. Throughout 2004 officials from all three cities held community meetings about the proposed redevelopment projects, collected data, and developed communication materials about increasing wastewater fees. In 2005 the cities continued to develop their waste-water fees program and implement the public participation techniques into their programs.

On September 8th, 2005 the team held a conference entitled "Challenges in City Management: The Lessons Learned from the CityLinks Program." The conference highlighted lessons learned by three Thai cities – Khon Kaen, Chiang Mai, and Phuket – that have worked over the past two years with experts from the City of Portland, Oregon to develop and incorporate public participation processes for city development projects, introduction of waste-water fees, and urban re-development projects. The second day of the conference featured a Train-the-Trainer workshop presented by a small training team from the city of Khon Kaen. This workshop launched the Public Participation Training Technique (and a written manual) developed by the cities participating in the CityLinks project. The training module will eventually be marketed all over Thailand to train municipalities on the art of incorporating public participation in their decision making processes.

KEY DATES

May 2003 – CityLinks City Selection

Chiang Mai, Khon Kaen, and Phuket were selected as the cities to participate in the CityLinks partnership.

September 2003- First Exchange to Portland

With all three Thai mayors in attendance, the first meeting between the Thai delegation and the Portland team: (1) clarified and refined the action plans for the three Thai cities; and (2) conducted a first round of training in public involvement principles and techniques.

October 2003 – September 2004 – Community and Stakeholder Meetings

Community and stakeholders meetings on the improvement of the riverside, canal reclamation, downtown area, and sustainable environmental management through sound financial practice were organized by the city of Chiang Mai, Khon Kaen, and Phuket.

June 2004 – Exchange to Portland involving Key Thai Nationals

A delegation of Thai staff involved in the day-to-day implementation of the projects in the three cities traveled to Portland to follow-up on the progress on the three cities' efforts and conduct public participation training sessions. At this point in the exchange, the Thai teams and the Portland team had developed a strong rapport and were able to work closely together with trust, humor and enthusiasm. This was a significant milestone as the ultimate success of the partnership was built in large part on the strong bonds developed at this exchange.

May 2-6, 2005 – Development of Public Participation Manual

Representatives from the City of Portland worked with the City of Khon Kaen to produce a manual on public participation techniques. The Portland team also provided a training workshop for Khon Kaen officials and the City's training team to prepare them for a training session following the *CityLinks Lesson Learned Conference*.

September 8-9, 2005 - Conference on "Challenges of City Management Lessons Learned from the CityLinks Program"

The Conference on "Challenges of City Management: Lessons Learned from the CityLinks Program" was held to highlight accomplishments, challenges and lessons learned as a result of the partnership program between the cities of Chiang Mai, Khon Kaen, Phuket and Portland. Following the conference, a one-day training session on public participation techniques was held for participants from cities around Thailand. The manual on "Public Participation Techniques for Local Governments", as a product of the CityLinks partnership program, was produced to be distributed at the conference.

SITUATION BEFORE THE INITIATIVE BEGAN

Most environmental planning efforts are "sold" to the public rather than developed through an inclusive process. As a result, it is much more difficult to take necessary and politically difficult actions. At the same time, cities continue to struggle with budgeting and financial management, as systems are generally weak and public involvement minimal. As a result, water, wastewater, and solid waste are provided at highly subsidized rates. While the Thai central government does not grant cities the necessary financial freedom to cover their costs for environmental services, most cities don't charge up to the amount that is allowed for these services.

ESTABLISHMENT OF PRIORITIES

Encourage locals and officials to adapt and understand participatory processes of engaging citizens in developing and implementing environmental and development projects. This was a priority established by the relatively new Thai constitution, and evolved in to a goal shared by the three Thai cities. Portland was selected as a good partner city because of their experience and expertise in public participation.

Improve environmental conditions along the proposed canals in Chiang Mai and Phuket, and in the old downtown district of Khon Kaen through the planning and design phases for all three municipalities for each redevelopment project.

Establish sound financial management initially though the establishment of a rate-based waste-water fees system. Through revenue from wastewater fees, cities can fund other projects related to bringing about better environmental conditions and improving the quality of life for their citizens.

FORMULATION OF OBJECTIVES AND STRATEGIES

Objective: Improve environmental management through prudent financial policies and promote consistent processes in city redevelopment.

Strategy: As established in 2003, the focus of the partnership was three-fold. First, each city was responsible for developing and implementing a redevelopment project: (1) the Ping Riverside Redevelopment Project in Chiang Mai; (2) the Bang Yai Canal Reclamation Project in Phuket; and (3) the Old Town /Rama Theater Redevelopment Project in Khon Kaen. Second, the three cities worked to improve environmental management by developing sounder financial practices, particularly by setting and then charging a fee for treating wastewater. Finally, each city used a variety of formats to inform the public about activities and conducted one or more public meetings. The cities were responsible for identifying an overall project manager, defining roles and responsibilities, developing internal and external communication plans, and developing public involvement strategies.

The process establishing a rate based system for waste water fees was as follows:

1. Experts from Portland, ICMA, and US-AEP worked with the cities to understand all the tasks required when implementing a rate-based system.
2. The cities were tasked with developing of a rate-based model suitable for their given context
3. The concepts of fees for services as well as the polluter pays principle were introduced to the public through public meetings, brochures, and school events.
4. Billing and collection policies were developed and implemented.
5. Public awareness was raised about how rate revenues were being used to build, operate, maintain, and expand systems.

Throughout the partnership, the cities improved the way they interacted with citizens and encouraged linkages among various stakeholders (e.g. educational institutions, NGOs, and other public and private sectors of the community). They also organized public meetings and executed public relations campaigns to enhance public involvement and strengthen public support.

Finally, a conference "Challenges of City Management: Lessons Learned from the CityLinks Program" was held on September 8, 2005 in Bangkok to highlight accomplishments, challenges, and lessons learned through the partnership. Over 150 participants from municipalities, NGOs, and the private sector attended.

The techniques of public participation process were shared by the city of Khon Kaen though the development of a public participation manual and training program "Public Participation Techniques for Local Governments". Following the conference, the initial training session on public participation techniques was held for 38 participants from cities around Thailand. More training sessions are planned to continue even after this partnership is completed.

MOBILIZATION OF RESOURCES

2003

- Study tours, exchanges, and workshops ($40,000)
- EPSG Fund exchanges/ workshops ($ 22,000)

Total: $62,000

2004

- Study tours, exchanges, and workshops ($45,000), Implement Component 2 ($10,000), Support a local counterpart institution (such as the Municipal League of Thailand) ($5,000) Total: $60,000
- Exchange funds will supplement funds as needed for the CityLinks projects (and will pay for a Thai delegation to attend the annual GFOA Conference in June, 2004) ($15,000)
- Cost Share Three participating Thai cities: ($30,000)

Total: $105,000

2005

- Travel, trainings, workshops, and capacity building activities ($32,000).
- Cost Share: Three Cities Partners, Municipal League of Thailand: Direct in-kind contribution ($9,000; 28% of obligated/contract funding).

Total: $41,000

PROCESS

US-AEP helped to facilitate a long-term partnership between Portland, Oregon and three Thai cities: Chiang Mai, Phuket, and Khon Kaen. This partnership focused on strengthening municipal management, improving public service delivery, and encouraging democratic participation. In addition, the three Thai cities were responsible for organizing activities to engage public participation and increase public support for their main projects and sub-projects.

The participating Thai cities selected two sub-projects to be undertaken under this project, including (1) the improvement of the downtown area and (2) sustainable environmental management through sound financial practice. The role of the partnership was assist the three Thai cities in developing mechanisms based on a public participation concept to increase public engagement in the two sub-projects as well as to strengthen collaboration between the municipalities on such issues.

To facilitate implementation of the project, project managers from each city were selected to design the implementation plan, select a project team, and facilitate coordination among the cities, Portland, and US-AEP. Mayors of each city were involved to provide overall support. Links between a wide spectrum of citizens and community members (e.g. educational institutions, non-governmental organizations (NGOs), and other public and private sectors of the community) were encouraged through various events such as public meetings and public relations campaigns within each city. The Municipal League of Thailand (MLT), a well respected organization among local municipalities in Thailand, was invited to

provide additional support for the final Lessons Learned Conference. Their involvement increased the outreach of the conference.

Various problems occurred that hampered the complete implementation of the projects, such as political and managerial problems, lack of adequate budget allocations, and uncontrollable factors (e.g. The Asian Tsunami). As well, some project mangers failed to follow through with project implementation due to a lack of ownership (not assuming responsibility), insufficient authority within the chain of command to accomplish necessary tasks, and a lack of human and financial capacity to complete tasks. The allocation of an adequate budget for each city was complicated by (1) negotiations with the central government to distribute funds, (2) negotiations with the treasury department for land, and (3) in Phuket, finding the political and human capital to get the project completed was difficult as tsunami recovery slowed progress and redirected funds for project implementation.

RESULTS ACHIEVED

The results achieved through its initiative varied widely among the cities. While all of the cities held some form of a public meeting for both the redevelopment project and the rate making fees, only Khon Kaen truly implemented and embraced the public participation process and incorporated it into their ongoing management structure.

The city of Khon Kaen held regular meetings to discuss the rate making and redevelopment projects. Due to the diligence of the project team, dedication from the Mayors office, acceptance from the community, and a realistic project size – Khon Kaen achieved significant progress. Both the redevelopment and rate making projects are in the implementation phase. The redevelopment project has been approved by the community and the city is currently bidding for contractors. The rate making project continues to be successful, after the identification of key stakeholders and a series of public/ stakeholder meetings the city has received the commitment from the stakeholders on the rate fees. Although not implemented yet, the city will phase in rate fees by stakeholder groups (i.e. start with hotels and industry, eventually add private business, residential etc) and plans to start changing industries and hotels are set to begin shortly.

Khon Kaen will continue to use the public participation techniques for development projects. The current management is highly supportive, and citizen council meetings occur regularly, on average once per month, depending on project needs.

The city of Phuket faced a significant challenge in the aftermath of the Tsunami; however, even with a change in priorities and government funds stretched thin – the city was still able to achieve results. Although they have no immediate plans to adopt waste water fees, the city has begun an aggressive redevelopment project that will continue to grow in the foreseeable future.

The City of Chang Mai has held meetings for both sub-projects, and they understand the complexities involved with the establishment of a waste water fee and implementing a redevelopment project. However, their efforts have been complicated by budget constraints due to the redirection of central government funds to Tsunami affected areas; consequently, the future of their projects remain uncertain.

SUSTAINABILITY

The City of Khon Kaen has gained valuable knowledge and training from the City of Portland and now seeks to assist other municipalities to engage their communities using methods and practices learned from Portland. Through the development of a public participation manual and the development of a "Train the Trainer" program, Khon Kaen will assist other municipalities struggling to engage the community to better understand the need and benefits of citizen participation. The City of Khon Kaen will serve as a national example and trainer of citizen participation.

LESSON LEARNED

Project Size: One key factor that contributed to Khon Kaen's success was the scope of project the city chose. They picked to complete a small but manageable project that falls within the constraints of their local budget and human capacity. Both Chaing Mai and Khon Kaen are in the wings waiting for further progress because they are dependent on funds from the central government and other organizations.

Initial Stakeholder Analysis: The city of Khon Kaen identified all key stakeholders before the implementation process. They involved the stakeholders (hotels, industries, citizens) at all stages of the rate making project and was able to negotiate acceptable fees and time table as well as identify what each stakeholder was capable and willing to contribute in terms of time, fees and technology.

Select the right people: The traditional management structure in Thailand is hierarchically structured; therefore, it is necessary to not only identify the right key participants who will implement the day to day activities (project mangers, coordinators, staff) but it is equally important to engage high level officials to provide the necessary support. In some cities the implementing project mangers lacked the political clout necessary to complete the work.

TRANSFERABILITY

The CityLinks Thailand Program grew out of the partnership between Rayong, Thailand and Portland, Oregon. That partnership was concerned with financial management, environmental management and citizen participation. Originally, it was hoped that the lessons learned from that partnership would be replicated through CityLinks. Unfortunately, the Mayor was not re-elected and the momentum for that component could not be sustained. The partnership did provide for the creation of a 5 year budget forecasting model, assisted the city to implement policies such as a balanced budget, increased citizen participation as the community through citizen task forces were involved in both the financial management and environmental management components.

The CityLinks model grew from the Resource Cities Program that partnered usually one international city with a US partner. From this program, US-AEP realized that often it is better to develop a program where the US partner is working with a consortium of cities to create a network for the cities to discuss and see best practices and to learn from each other's experience and expertise. It was important that the three Thai cities have similar priorities so that the technical assistance is more targeted.

Portland has been through the ringer with public involvement on planning projects in Portland, so the city was able to share their successes and failures, with some insight about what went wrong in the failures. The trust developed with the Thai teams allowed for a fairly candid exchange.

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USAID FROM THE AMERICAN PEOPLE | THAILAND

FIRST PERSON
Changing the Political Culture

Citizens become directly involved with initiating local environmental regulations

Photo: Stanford Smith, US-AEP

"For several years, the city conducted citizen meetings, but we ran the meetings by trial and error," says Mayor Peerapol Pattanapeeradej. "Using Portland's 30 years of experience in promoting public participation has allowed us to quickly adapt these methods to satisfy my goal of getting citizens involved."

As Thailand's local government assumes greater responsibility for environmental management, stopping environmental deterioration has become a critical challenge for municipal leaders. USAID's CityLinks partnership between Portland, Oregon, and Chiang Mai, Khon Kaen and Phuket was established to help Thai officials find ways to address that challenge — with the help of community members.

Mayor Peerapol Pattanapeeradej says the partnership has been highly beneficial for Khon Kaen. He followed Portland's recommendations to conduct combination town-hall/open-house meetings and involve stakeholders in developing new regulations. To prepare for the introduction of a new wastewater treatment fee, he arranged public meetings, where city officials talked with water consumers about billing, collection and subsidies. Ultimately, the city was able to broker a landmark agreement — with significant community support — to collect tariffs from large wastewater producers, such as hotels and shopping complexes.

"For several years, the city conducted citizen meetings, but we ran the meetings by trial and error," said the Mayor. "Through the CityLinks program and working with the city of Portland, we learned proven citizen participation techniques."

Mayor Peerapol says these innovative public participation tools give citizens a sense of ownership in public decision-making — and they give him a new avenue for progress. "I want to change the political culture. Before, the city operated projects on their own — now I can get citizens directly involved."

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FROM THE AMERICAN PEOPLE

CASE STUDY
Cleaner Vehicles, Cleaner Air

New fuel and emission standards improve the health of city dwellers

Photo: Doan Van Huu

Today, Vietnam's cities are crammed with cars, trucks and motorcycles.

"My colleagues and I have learned that preventative measures can minimize air pollution in rapidly growing cities," says Tran Duc Hoa of the Ministry of Science and Technology. "We don't want Vietnam left behind other countries."

Challenge

Ten years ago most urban Vietnamese rode bicycles, but over the last decade rapid industrialization has contributed to a sharp rise in the use of motorized vehicles. Vietnam's cities are now crammed with cars, trucks and motorcycles; Ho Chi Minh City alone has more than 3 million motorbikes for just over 5 million people. These vehicles create emissions containing lead, carbon monoxide, sulfur dioxide, ozone and fine particulate matter — and cause significant health impacts. Exposure to outdoor air pollution is associated with a range of health problems, from chronic asthma to respiratory and cardiovascular disease. Young children are especially vulnerable. Elevated lead levels in the blood, for example, stunt brain development and reduce learning ability.

Initiative

In 2001, USAID began working with the Ministry of Transportation to improve urban air quality. The government formed a partnership with the private sector and, in less than a year, had phased out leaded gas nationwide. Building on this success, USAID supported workshops and conferences with Vietnamese air-quality experts on the importance of developing tighter vehicle emissions and fuel standards. Vietnam recently enacted cleaner EURO 2 standards for new motorbikes. USAID is also promoting increased awareness among government officials, industry leaders and the public about the links between stricter standards, better air quality and human health.

Results

The phase-out of leaded gasoline has reduced lead exposure for millions of city dwellers — particularly the poor, who tend to live along congested roads. Since motorbikes represent 90 percent of vehicles, the new EURO 2 standards ensure that the estimated 10 million new motorcycles expected on Vietnam's roads in the coming decade will emit less pollution. Looking still forward, USAID is supporting further development of a "roadmap" to gradually phase in even cleaner standards for automotive emissions and fuel quality. With USAID's support, Vietnam is taking proactive measures to keep its skies blue and its people healthy.

USAID | VIETNAM
FROM THE AMERICAN PEOPLE

CASE STUDY
Eco-Tourism Reaps Benefits

Resorts and residents benefit from sustainable tourism practices

Photo: Flora and Fauna International

Cat Ba Island, once a sleepy fishing village, is now a resort town.

"I learned a lot about community-based tourism and especially about how to do cultural performances and home stays. [The project] also helped me make contacts with tour operators," said Nguyen Thi Thuy Lanh, chair of the Viet Hai tourism association.

Challenge

Vietnam is in the midst of a tourism boom that is bringing much needed economic growth to coastal communities, but creating challenges in ecologically sensitive areas of the country. On Cat Ba Island, a UNESCO Biosphere Reserve in picturesque Ha Long Bay, tourism development has depleted fresh water supplies while wastewater pollution in the harbor has noticeably increased. Cat Ba town, once a sleepy fishing village, is now a major resort town sporting more than 100 multi-story hotels, with many more under construction. As a result, local inhabitants have begun to suffer from many of the negative social and environmental impacts of tourism growth, such as increasing prostitution, drug addiction and pollution.

Initiative

USAID is supporting efforts to introduce environmentally friendly tourism practices on Cat Ba Island that provide economic benefits to the local population, not just city-based tourism companies. A pilot project is raising awareness of eco-tourism opportunities to demonstrate that sustainable tourism practices can provide higher-yield, lower-impact benefits. Activities have included training hotels in eco-certification standards for energy and water use, building the capacity of a local hotel association, promoting traditional architecture and performances to attract eco-tourists, and developing a community-based cooperative in Viet Hai, a village in Cat Ba National Park. Residents involved in tourism development have visited other areas of Vietnam and Thailand to learn best practices in developing tourism that helps the poor.

Impact

Hotel owners in Cat Ba have begun to realize the benefits of eco-certification standards, from reduced water and electricity use to new marketing opportunities. In addition, the Vietnam National Tourism Administration recently revised the draft Law on Tourism to include sections that specifically promote eco-certification. In Viet Hai, villagers and leaders have come to understand that lower-impact, community-based tourism is more beneficial when the revenue generated goes to residents. The success of the program is serving as a model for alternative, more sustainable development in Cat Ba Island.

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FROM THE AMERICAN PEOPLE

FIRST PERSON
Women with No Time to Waste

Ho Chi Minh City's private waste collectors organize to improve lives and livelihoods

Photo: Mark Mason, US-AEP

"Two-thirds of the waste collectors are women and many are mothers, so health is very important to us," says Trang Thu Nguyen. "I now wear gloves so that I touch the trash much less… Also, if one of us becomes sick, we have access to health funds and the hospital."

Trang Thu Nguyen is an informal waste collector in Vietnam's Ho Chi Minh City. "I've been in this business for 13 years, and I was always concerned about the health risks to me and to my younger brother who helps me. But I didn't know enough about the germs and dangers to do anything about it."

Trang used a rudimentary pushcart to collect the trash she picked up off the street, often with her bare hands. She had no access to health care, and when she got sick it was difficult to maintain her already meager income. Almost two-thirds of waste collectors in Trang's district are women. Their wages are low — $100–$150 a month — and few have written contracts. Collecting fees from residents is difficult, and conflicts with other waste collectors over routes are common.

In 2003, USAID helped launch a project to boost the efficiency of solid waste management and improve the working conditions of Ho Chi Minh City's informal waste collectors. Collection routes were mapped and rearranged, improving the city's waste collection services and reducing conflicts among collectors. And support from city authorities helped waste collectors establish written contracts with households and formalize the fee collection process.

To boost waste collectors' standard of living, a local group worked with the Department of Natural Resources and Environment to organize the collectors into a syndicate, which now has 180 members in five city districts. Members of the syndicate were given safety training, tetanus immunizations, physical exams and health cards for state hospitals. They also attended financial planning sessions that helped them set up a health and savings fund that syndicate members contribute to monthly. Syndicate members' old metal and wood collection carts were replaced with light, durable plastic carts that don't leak and can be automatically hoisted at the local transfer station. Collectors also received uniforms and protective gear, including gloves, a cap, a mask and plastic boots.

"Two-thirds of the waste collectors are women and many are mothers, so health is very important to us," says Trang. "I now wear gloves so that I touch the trash much less… Also, if one of us becomes sick, we have access to health funds and the hospital."

Water Allocation Planning and Management in Vietnam

A BEST PRACTICES CASE STUDY: VIETNAM

SUMMARY

Throughout 2005, The United States – Asia Environmental Partnership (US-AEP) worked in partnership with the Department of Water Resources Management (DWRM) to develop policies and build capacities in Integrated Water Resources Management. It is an area where Vietnam has identified a variety of reforms involving new approaches and requiring new skills. One critical need revolves around the management of water allocation: providing water to meet basic livelihood needs, for socio-economic development in urban and industrial areas, for agriculture, hydropower, and for the environment. Integrated rather than sector-based planning and management is required to meet the growing needs for water. Successful transition to an integrated approach will be essential if Vietnam is to meet its goals for sustainable economic development and poverty alleviation.

This initiative aimed to equip the Department of Water Resources Management (DWRM) with a detailed understanding of the general approaches used around the world in allocating water to different users, efficiently and fairly, while at the same time ensuring the long term environmental sustainability of the river basin system.

The results of the project included developing and piloting a framework, step-by-step process, and local sub-basin

INSIDE

case study for water allocation planning. Participatory planning, economic tools, a framework and process for environmental flows assessment were utilized. The initiative also improved coordination among Ministries involved in water resources by encouraging stakeholder consultation processes to identify the critical issues in water allocation in Vietnam.

One of the key outcomes of the project was the signing of a bilateral cooperative agreement for future collaboration between the governments of Vietnam and South Africa across many key institutional, technical, and regulatory aspects of integrated water resources management.

More generally, the initiative improved the capability and knowledge of key staff in the Department of Water Resources (DWRM) and provincial level stakeholders. It built awareness of the important role of the Department of Water Resources in developing an integrated approach to water resource management and how this is planned to be rolled out at the river basin scale.

Key Dates

April 2005:	Workshop on environmental flow management
June - July 2005:	Jointly funded study exchange to South Africa
July - August 2005:	Ministerial level consultation process
August 2005:	Workshop on water allocation planning and management
August – October 2005:	Sub-basin case study

SITUATION BEFORE THE INITIATIVE BEGAN

Like many of its South East Asian neighbors, water resource management in Vietnam is in a state of flux. Until recently water management has been characterized by a sector specific approach aimed at maximizing the use of water for agricultural production, rural development and food security. However, rapid industrialization and urbanization associated with the transition to a more market-oriented socialist economy has transformed the face of society, and at the same time resulted in a new set of challenges for water resources and their management. Common issues throughout Vietnam include dry season conflicts over water, water quality degradation (particularly in the river basins surrounding Hanoi and Ho Chi Minh City), worsening affects of seawater intrusion, the ever-present effects of floods and severe storms, and the threat posed by the impacts of global climate change.

ESTABLISHMENT OF PRIORITIES

US-AEP worked with the Department of Water Resources Management (DWRM) throughout 2005 to explore and define procedures that could be used at the river basin or sub-basin scale to support sustainable water allocation decisions.

Initially the process aimed to provide a more environmentally sustainable basis for decisions regarding the long-term management of water flows by reviewing and analyzing international examples of environmental flow assessment methodologies and assessing their suitability for Vietnam. At a cross Ministerial workshop to present and discuss the results of the study a number of messages from the

participants of the workshop reinforced the fact that human needs, demands, and values drive water allocation in Vietnam. Consequently, the process developed specifically addresses the inclusion of water for living as a key downstream flow requirement.

Following from the environmental flows component and the study tour to South Africa, it was decided to focus future work on the process for overarching decisions about water allocation and management recognizing the needs of all users including the environment. In Vietnam, some of these needs include: water for living, agriculture, hydropower generation, in-stream fisheries, aquaculture production, transportation, urban supply, tourism and recreation, environmental values, cultural and heritage values, and flood protection.

The key priorities selected to address these issues included efforts to:

- Undertake a national level consultation process with key Ministries to identify current and future needs for water, issues and suitable approaches;
- Hold an inter-Ministerial workshop to present and discuss key aspects of water allocation planning and management; and,
- Undertake a sub-basin scale case study to trial a framework for water allocation planning based on participatory planning and economic techniques in order to assess the trade-offs associated with alternative allocations for various uses.

MOBILIZATION OF RESOURCES

Since the goal of the activities was to build capacity within the Department of Water Resources Management (DWRM) and its staff, all activities and resources were mobilized in close collaboration with the DWRM, with strong leadership and involvement provided by Dr. Nguyen Thai Lai, the Director General of the Department. US-AEP provided overall coordination and management of the activities and leveraged resources from the Ecology and Environment Institute of Vietnam (a local NGO), local water resources experts, international consultants and volunteers, and the pro-bono services of URS Sustainable Development, a company specializing in natural resource management in developing countries.

It was also possible to organize and fund a study exchange to South Africa by combining US-AEP resources with the Danish International Development Agency (DANIDA) and the Asian Development Bank's National Coordination for Water Resources Management Project (TA3528 – VIE). The activity amounted to $110,000 USD, including cost contributions from DWRM.

PROCESS

Environmental flows assessment

The study on environmental flows management developed a framework that could be applied to environmental flows management in Vietnam. The framework was based on a review of international approaches and an assessment of Vietnam's needs and capacities. The approach developed took

account of the specific context of different rivers and situations, recognizing that resources are limited and needs vary depending on whether a new major structure is to be developed on an unregulated river or a river with existing hydraulic structures. The workshop presentation of the study results indicated that management of downstream water flows and availability is largely driven by socio-economic rather than environmental needs.

Study exchange to South Africa

The aim of the exchange was to provide an opportunity for Vietnam government officials to learn from the practical experiences that South Africa has gained in putting arrangements in place to achieve integrated water resource management. South Africa has undertaking a number of major water reform initiatives in recent years.

All of the issues South Africa is dealing with are of direct relevance to Vietnam. South Africa has developed from a position similar to that which Vietnam now faces. Many of the solutions for both countries will be the same – but South Africa is more advanced in the timing of its reform programs. It has moved to the implementation stage of many of its initiatives. This means that Vietnam could learn a lot from South Africa about the processes of reform and implementation experiences.
The exchange included more than a week of solid discussions, presentations, and field-based learning on a diverse range of topics related to water resource management. A total of 16 delegates across a number of national and provincial government departments attended the exchange.

At the end of the exchange, each of the delegates was asked to comment on the things that had impressed them. Some of these comments included:

- South Africa presents a very strong model in many ways. But turning the theory of the approach into practice will be where Vietnam can get the maximum benefit.
- The level of public participation at all levels is impressive – but Vietnam should learn from the South African experience so that consultation can be effective and not slow down the implementation process.
- The focus on environmental health is a strong direction and vision.
- South Africa is serious about sustainable development and is good at incorporating environmental protection into development.
- There may be a need to provide greater levels of protection to the poor and disadvantaged.
- The use of water initiatives to create job opportunities is impressive.
- There is obviously a very good planning system – it is understood at all levels and is well thought out. It spans form the strategic level to implementation.

Inter-Ministry national consultation process

A national level consultation process occurred in July and August 2005 to demonstrate the DWRM's commitment to developing a more coordinated approach to water resource management. The process was based on the premise that understanding the needs of national level stakeholders is a critical first step in constructing the vision for a more integrated approach to water resource management.

The purpose of the interviews was to obtain stakeholder perceptions regarding a range of national issues relating to sustainable water allocation including:

- current and future demands for water;
- impacts of current and expected future patterns of use;
- the priorities for water allocation;
- the important needs of their sector that would affect how a water allocation could be defined; and,
- developing effective processes for water allocation in the Vietnamese context.

Cross sector analysis of the results indicated that water demand is expected to increase most dramatically in sectors that are more strongly linked with Vietnam's goals in relation to development and industrialization. Thus, urban demand, hydro-electricity demand, and industrial demand along with tourism are likely to grow strongly. Aquaculture is a major growth industry in rural Vietnam and the sector's water use is expected to significantly increase over the next 10 to 15 years. Many stakeholders expected that irrigated agriculture would reduce in demand or not grow substantially as Vietnam focuses more strongly on industrialization. However, in terms of actual quantities of water, it is still likely that agriculture will increase the most.

There were many overlapping needs identified and many similar responses. Most of the stakeholders identified water quantity and quality as their two major requirements in regards to water. However, the process identified a number of needs for water that had not been previously considered in great detail. For example, river based transportation, an important economic use of water, requires increases in the depth of flow in the dry season and velocity control in the wet season.

Stakeholders generally reinforced the government's policy of 'water for living' as the first priority for water allocation in times of shortage. Many stakeholders stated that irrigated agriculture, especially rice, should be given lowest priority. Others felt that a more situation specific assessment of priorities is required based on specific local needs.

Stakeholders discussed the importance of establishing water allocation planning processes in an integrated manner across all sectors to address competing needs. They were generally very supportive of the DWRM and the Ministry of Natural Resources and Environment's role in national coordination of this process and they stressed the importance of developing clear objectives and measurable criteria that maximized the overall economic, social and environmental benefits of the nation's water resources.

The participatory nature of the process demonstrated the benefits of a collaborative and consultative approach to water resource management in developing mutual understanding in what is a challenging yet critical task if Vietnam is to achieve its goals for sustainable economic development and poverty reduction.

Inter-Ministry workshop on the key principles of water allocation planning and management

A two day workshop of senior officials from the Ministry of Environment and Natural Resources (MONRE) and from several ministries with an interest in water was held to openly discuss the key

issues associated with water allocation in Vietnam. It was also an opportunity to present the findings of the national level consultation process and cross sector analysis.

The workshop presented the objectives and results of the national level ministerial interviews and highlighted international best practices and concepts supporting efficient, sustainable and equitable water allocation using case studies and examples from Vietnam and abroad. The success of the workshop was evident in the discussion within and the workshop sessions and more informally throughout the two days. It provided an excellent opportunity for the DWRM to build relationships with other sector based authorities in hydropower (Electricity Vietnam), fisheries, tourism and others.

Sub-basin case study

The case study in the Nhue Day sub-river basin involved detailed discussions with approximately 25 provincial level government departments across the six provinces in the sub-basin. This included representatives from the departments of natural resources and environment, agriculture and rural development, health, construction (for urban water use), industry, and fisheries. Current and future demand estimates were provided and any issues associated with water allocation were identified. The consultation process also provided an opportunity to build understanding and awareness of river basin management and water allocation in particular. For many of the authorities, such as health, it was the first time they had assessed their water demand across the province.

The participatory planning and economic framework developed for the project includes a step-by-step process and detailed guidelines on how the process can be completed as well as discussion of some of the key aspects. The data from the Nhue Day was then used to demonstrate and illustrate this process further. The case study concluded with a set of recommendations for further work both in the Nhue Day sub-basin and for national level policy development and capacity building.

The process highlighted that water allocation planning is a multidisciplinary task requiring water resource, environmental science, economics and other technical skills. Developing these multi-disciplinary teams that can effectively implement a water allocation planning process is a key challenge for the future.

There is a great level of interest in further developing and using hydro-economic modeling of water resources in Vietnam to assist in efficient, sustainable and equitable management. The Department's staff is now aware of the process, its benefits, limitations and resource requirements. The process also demonstrated the benefits of using consultation in the planning and decision making process.

RESULTS ACHIEVED

As the activities were largely focused on capacity building to enable Vietnam to improve its management of water resources, it is difficult to measure their impact in the short-term. These are long-term investments in the human resources and social capital within Vietnam's water resources management professionals.

The Environmental Flows workshop and study exchange to South Africa resulted in MoNRE acknowledging that Vietnam could face grim environmental, economic and social impacts. Therefore, Vietnam needs to work out how to reach consensus on the balance between water development and maintaining the continued values of healthy and productive water resources systems.

At the National Environment and River Flows Workshop in April 2005, Vietnamese officials examined environmental flows concepts and considered how they might be applied to the Vietnamese context. Dr. Nguyen Cong Thanh, Vice Minister of the Ministry of Natural Resources and the Environment stated that "The health of our rivers and aquifers is vital to the Vietnamese ... our prosperity, our environment, our communities, and our future depend on it." Dr. Nguyen Thai Lai, the Director General of the DWRM, stated that water for the environment and public consultation will be incorporated into River Basin Plans which include water allocation rules and the water protection plan

In the longer term, the work undertaken is expected to contribute to:

- Better co-ordination and integration between sectors and institutions from a local to a provincial and national level in the sustainable and efficient management and use of water resources;
- The development of effective provincial and national laws, policies, decrees, and guidelines relating to water allocation planning;
- Improved institutional and human resource capacity at the national and provincial level;
- Changes to local or national decision-making processes and the development of coordinated river basin organisations;
- Changes in people's attitudes and behavior in relation to the use and protection of water resources; and,
- Improvement in people's living standards and contribution to national goals of sustainable economic development and poverty reduction.

However, the program resulted in a range of positive experiences for those involved and some key changes directly attributable to the activities, for example:

- The DWRM has embraced consultation as an effective means to share ideas, obtain information, and build awareness and support for their vision and plan for water resource management in Vietnam.
- The key principles of water allocation across competing uses, including the planning life cycle, are now well understood within DWRM.
- The project activities built a basic understanding of what is meant by the economic value of water and the basic tools available for assessment. Economics, and particularly the economics of natural resources and the environment, is a very new topic in Vietnam, especially in relation to water.

Following on from the initiative, further work is being developed:

- Further pilot water allocation planning projects are being actively encouraged in Vietnam by the DWRM in key river basins where they are currently active, and existing projects have been requested to consider water allocation in future phases.

- A bilateral cooperative agreement on water resources management has been signed between the Government of South Africa and the Government of Vietnam, which will help support the following efforts:
    - Water allocation reform
    - Resource directed measures with a focus on (1) establishing a long term management framework; (2) taking immediate action to establish holding positions where water sources are highly stressed; and (3) protecting community benefits from water.
    - Legal and institutional arrangements
    - Water service provision, with a focus on institutional arrangements and legal instruments to protect business viability, the resource, the environment, and customers.
    - International relations
    - Education and research

LESSONS LEARNED

Effective capacity building requires trust and understanding. This takes time and effort to work together on activities and learning together. Besides providing a better learning environment, building trust also leads to more open discussion and debate. This concept was applied at many levels in the program, both between international and local resources and among the DWRM and other national and provincial level authorities. The importance and benefits of stakeholder consultation should never be underestimated as the process is as important as the end outcome.

Effective water resources management covers many skills and disciplines. Even in the English language, communication of ideas and linking these disciplines together is a difficult. Everyone thinks differently. But building consensus and the 'big picture' is a critical task in ensuring the best processes are followed and the best possible decisions are made. Adding a cross cultural layer to this means that communication is critical. A lot of lessons were learnt throughout the process relating to effective communication. We ensured that all translations of reports, papers, and presentations were thoroughly reviewed and used the services of proficient translators who thoroughly understood the subject area. We worked with translators prior to presentations to ensure that they had a good understanding of all the complex concepts being delivered and built the skills of several staff in the DWRM in these areas.

There has been a great deal of on-going interest in the activities of the program and there is a great deal of momentum in water allocation as a high priority issue for the DWRM. The DWRM is now driving the agenda on water allocation with donors, NGOs and within government.

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LESSONS LEARNED SUMMARY

This report summarizes the results of a Lessons Learned analysis undertaken in FY 2005, the final year of implementation of USAID's US-Asia Environmental Partnership (US-AEP). This analysis identified the programmatic strengths (and weaknesses) exhibited by US-AEP over the last five years in its attempts to achieve targeted results. By focusing on how the program worked, rather than what the program worked on, this lessons learned activity aimed to distill views relevant to USAID and others in future regional programming efforts applicable across a variety of technical areas and sectors.

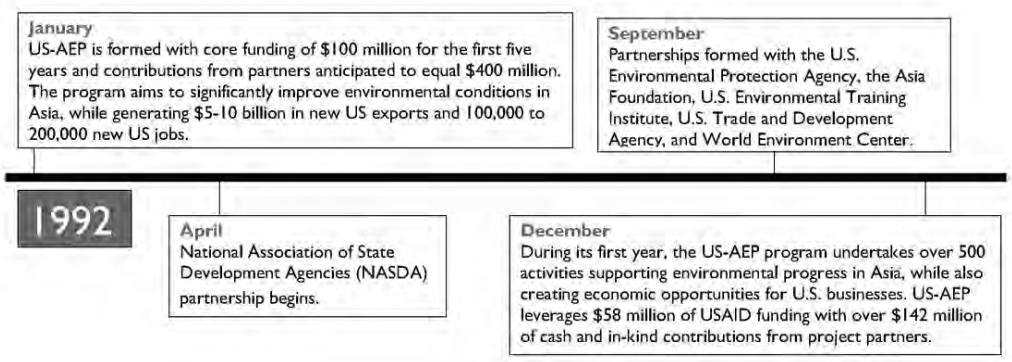
BACKGROUND

Over the past two decades, Asia has experienced some of the most dramatic economic growth in the world, significantly reducing poverty levels in many countries. However, the combination of rapid economic growth, industrialization, and urbanization has also contributed to deteriorating environmental conditions, as well as negative health and economic impacts throughout the region.

To respond to the challenge presented by these problems, President George H.W. Bush launched US-AEP by Presidential Initiative in January 1992. Led by USAID as a public-private program, US-AEP worked through direct peer-to-peer partnering to develop and implement practical solutions to environmental challenges, bringing experts and practitioners together to share knowledge and to act directly and in concert to solve problems. Many activities created private-private and private-public partnerships and linkages that endure beyond the end of the program in fiscal year 2005.

> ***"… a creative approach to address the challenge of balancing environmental protection with development."***
> **PRESIDENT GEORGE H.W. BUSH**

Throughout its more than 12 year history, US-AEP evolved to meet changing circumstances, both within the U.S. government and in the region. The timeline displayed across the bottom of the pages of this report shows highlights and milestones in US-AEP's history that



serve to illustrate the progression of the program over time. It is possible, from this progression, to identify three phases of program focus through which US-AEP moved:

- Phase 1: An emphasis on trade promotion activities with the U.S. Department of Commerce (DOC) as a key partner;
- Phase 2: A narrowed focus on greening of Asian businesses; and
- Phase 3: A shift to encouraging a "clean revolution" in Asia with a heightened focus on improved environmental governance and intra-regional cooperation.

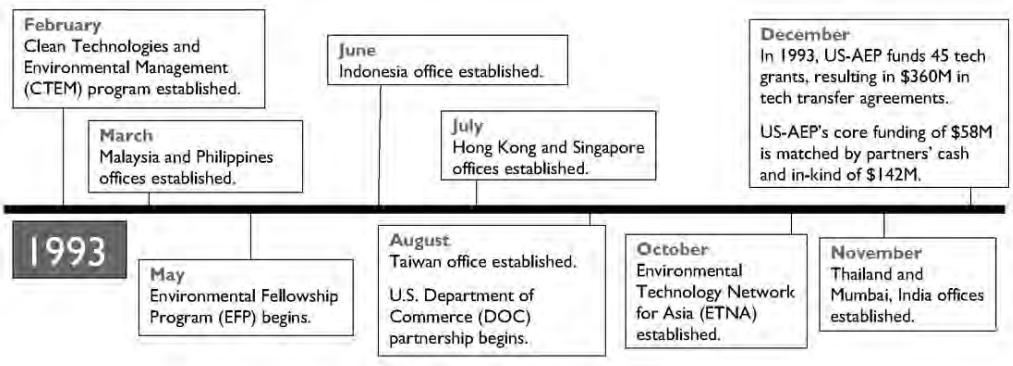
While the program experienced significant change over its life, one constant was US-AEP's focus on "partnerships" as a defining feature.

This lessons learned activity, like the Strategic Objective Closeout Report that it supports, focuses on the third phase of the program that covered the final five years of implementation, FY 2001 through FY 2005. This period was marked by several significant program and management changes that had a significant impact on the implementation of the program. Key changes in this period included:

- The withdrawal of DOC involvement in 2002;
- A reduction in the number of countries participating in the program (related to the withdrawal of DOC), from eleven in early 2001 to six primary implementation countries (India, Indonesia, Philippines, Sri Lanka, Thailand, and Vietnam); and
- A shift in program management in mid-FY2003 from USAID/Washington to the USAID Regional Development Mission/Asia (RDM/A) in Bangkok.

US-AEP worked with numerous implementing partners and literally hundreds of local program partners throughout its history. Implementing partners during the final five years of the program included:

- U.S. Environmental Protection Agency (USEPA), accessed through an interagency agreement (IAA):
- National Oceanic and Atmospheric Administration, also accessed through an IAA;
- A number of contractors/cooperators: the Institute for International Education, the Louis Berger Group, PADCO, the National Association of State Development Agencies



(NASDA), the Alliance to Save Energy, and the International City Managers Association (ICMA).

- Organizations with cost-sharing agreements: the Council of State Governments, Global Technology Network (GTN) and Environmental Technology Network for Asia (ETNA), and The Asia Foundation; and
- Numerous non-governmental organizations (NGOs) and professional associations in Asia and the U.S.

At the time of program completion in FY 2005, the number of implementing partners had been reduced, primarily with the departure of organizations more closely associated with the program's trade and technology transfer focus prior to the withdrawal of DOC.

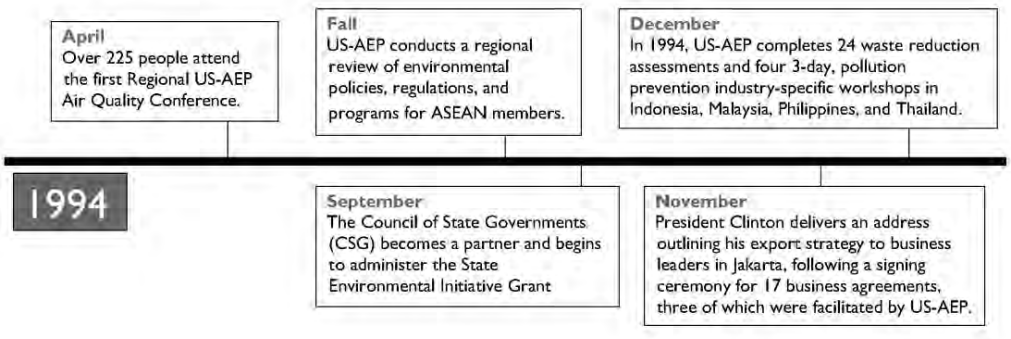
LESSONS LEARNED

The lessons learn activity began with an extensive review and analysis of existing program documentation, which led to development of a questionnaire focused on frequently-cited, key program characteristics. Interviews were then conducted with selected program personnel from US-AEP country teams, implementing partner organizations, and local partners to obtain information on the perceived importance of certain program characteristics.

Important Program Characteristics: Interviewees were asked to rate the importance, from "essential" to "not important," of five US-AEP program characteristics that have been successfully used to achieve US-AEP's overall goal of promoting a clean revolution in Asia. Average ratings were calculated from the ratings provided (with equal weight given to all interviewee responses), resulting in the following overall ranking of key program characteristics:

Rank	Characteristic	Average Rating
1	Ability to leverage other resources	1.3
2	Programming flexibility/opportunism	1.5
3	Regional program implementation	2.0
4	Partnership approach	2.3
5	Use of exchanges	2.3

Ratings: 1) essential, 2) moderately important, 3) not too important, 4) not important



Significantly, none of the individuals interviewed suggested that any of these characteristics were unimportant to US-AEP's success. In fact, at least one interviewee ranked each characteristic as "essential." However, only two characteristics were cited by all interviewees as either essential or moderately important – *the ability to leverage additional resources* and *program flexibility.*

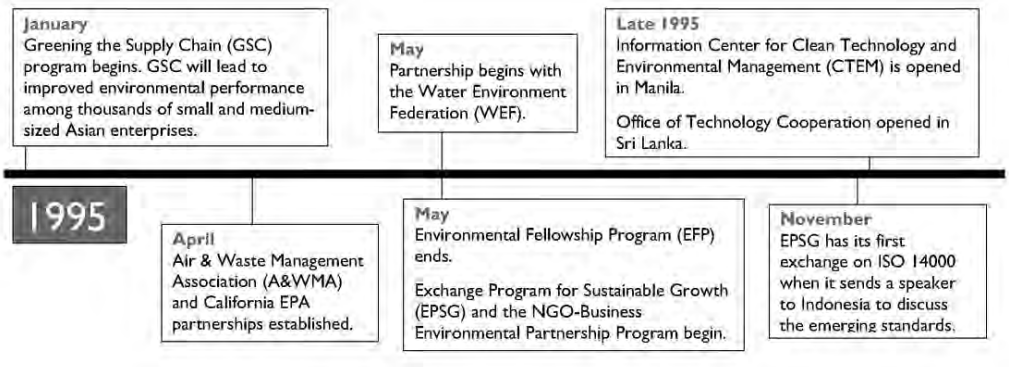
The reasons why US-AEP staff and partners viewed these operational characteristics as so important and the lessons learned from applying them are discussed in the remainder of this report.

Resource Leveraging: Outside resources leveraged by US-AEP included substantial in-kind contributions from local partners and complimentary funding from other donors. This leveraging was important for US-AEP because of the limited size of available US-AEP program resources (e.g., small grants and short-term technical assistance were generally limited to agreements and contracts valued at $25,000 or less) and the large scale and varied nature of environmental challenges facing countries in the region.

Most US-AEP staff interviewed believed that leveraging additional resources was essential to US-AEP's success, both in ensuring commitment to achieving results among local partner organizations and in achieving broad and sustained project impacts.

While leveraging was uniformly cited across all US-AEP countries as essential to the program's success, it is interesting to note that the primary sources of leveraged funds often varied from country to country. In Thailand, for example, where bilateral donor assistance has been largely phased out in recent years, leveraged resources came primarily from local Thai partners themselves. These contributions included staff time and self-funding of travel on exchanges. In other countries, such as Indonesia, where international donors are still very active, leveraged funds from organizations like the Asian Development Bank and the World Bank, as well as bilateral donors (e.g., Swiss Contact) were more common and important.

> ***"Together US-AEP and EPA provide unique knowledge transfer resources and capabilities that complement the World Bank's technical assistance ..."***
> **P. ILLANGOVAN, SENIOR ENVIRONMENTAL SPECIALIST, WORLD BANK**

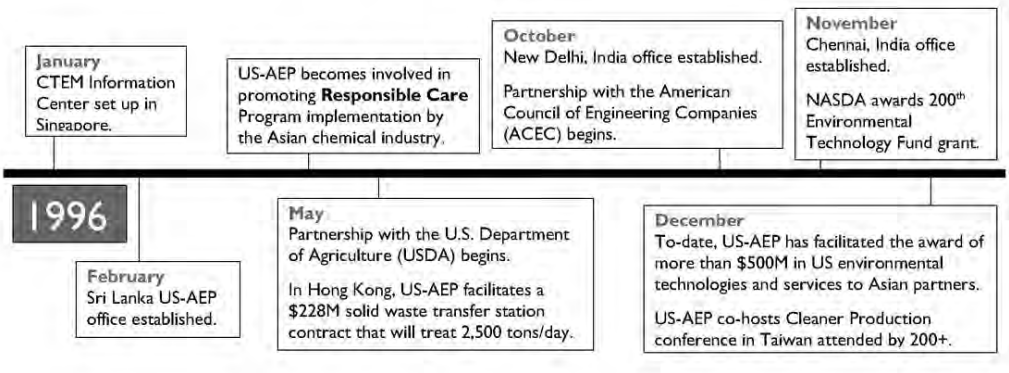


It is also interesting to note that among US-AEP staff, the ability to successfully leverage resources (ranked first as a key program characteristic) was strongly linked to the development of partnerships (ranked fourth among the top five program characteristics identified in this analysis). US-AEP staff generally expressed the opinion that the key to successfully leveraging resources was to *actively develop and maintain partner relationships*. These staff indicated that the long-term presence, high visibility, and wide recognition of US-AEP country programs allowed the development of these relationships with other donors and in-country sector leaders. Also, US-AEP's on-going and consistent commitment to addressing particular environmental challenges, such as the phase out of leaded fuel in several countries, established the credibility needed to attract outside resources.

US-AEP maintained and developed these relationships by strategically using flexible program funding. One way this was accomplished was through "gap filling" where small grants, technical assistance, or exchanges were used to advance larger initiatives supported by other donors and local partners. One example of this type of effort was an activity in Sri Lanka that supported a local NGO's efforts to improve women's livelihoods through the collection and sale of recyclables. A critical need in this project was improved recycling technology that would increase the value of the materials collected by the women involved in the project. US-AEP supplied technical assistance to improve the processing of recyclable plastics, tripling the value of the materials. The increased value of the product helped make the NGO's larger microfinance and livelihoods program viable and helped decrease the amount of waste flowing to the local municipal landfill by twenty percent.

Many program staff and partners also emphasized that successful leveraging often resulted from using program resources as catalysts to advance innovative solutions. This "venture capital" approach facilitated piloting of a number of successful technologies and policies. By demonstrating these successes, US-AEP was able to leverage subsequent large-scale support to expand these pilots, either with additional USAID or outside funding. For example, US-AEP initiated the Clean Air Program (CAP) in Puerto Princesa, Philippines, an innovative approach to improve municipal air quality, including special programs to reducing emissions from highly polluting three-wheeled taxis. CAP has been replicated in other Philippines cities, will now continue with funding from the Asian Development Bank.

Some interviewees suggested that additional resources might have been leveraged if US-AEP had done more to coordinate common efforts regionally. For example, although several US-



AEP country programs focused heavily on the promotion of lead free gasoline and improved fuel quality standards, these efforts were not closely coordinated at the regional level. Some interviewees suggested that if country level efforts had been more formally linked through the establishment of cooperative regional networks, it might have been possible to leverage additional donor support.

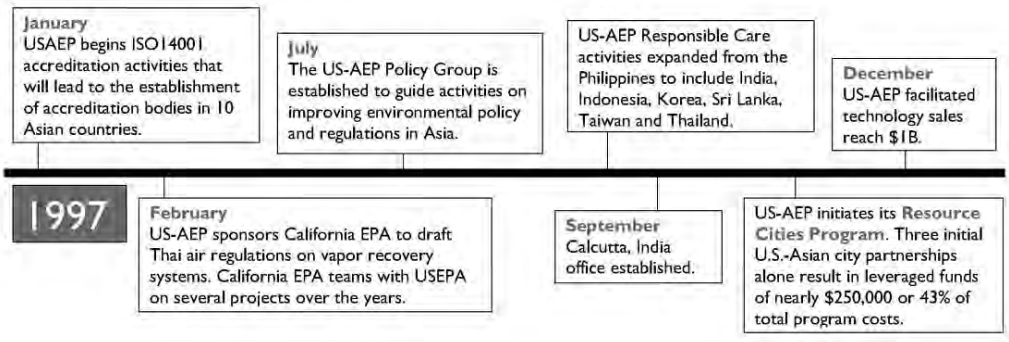
Program Flexibility: In addition to resource leveraging, another highly lauded US-AEP hallmark was the flexible nature of its activity support. Although individual country programs were guided by annual work plans, it was also possible to provide unplanned support through the use of small grants, technical assistance, and exchanges on short-notice for strategically important activities. This flexibility allowed for small but effective rapid responses to changing needs and emerging opportunities.

Over the period that US-AEP was active in Asia, many economic and political changes required adaptation of program support. US-AEP's flexible programming mechanisms allowed for rapid response to such changes, something that many other larger donor programs had difficulty doing. An excellent example of this was the effectiveness of US-AEP's assistance to the water supply sector in Indonesia.

"US-AEP is a speedboat among supertankers."
US CONSUL GENERAL, KOLKATA. INDIA

By the end of the 1990s, the combination of the regional economic downturn that began in 1997 and Indonesian government efforts to decentralize government operations was placing significant new management and financial burdens on local water utilities. While most donor assistance continued to focus on expanding water supply infrastructure through large-scale loan mechanisms, US-AEP quickly developed a set of activities supporting improved utility operational and financial management – a critical need at that time. These activities were highly successful in improving water utility management. Not only did they help to keep several participating utilities financially solvent, but many activity elements became models for subsequent donor programs.

US-AEP program flexibility also allowed the program to contribute significantly to many environmental policy developments in the region. Environmental policy change often happens quickly in response to a critical combination of political and economic factors, so-called tipping points. When these tipping points are reached, government officials are often

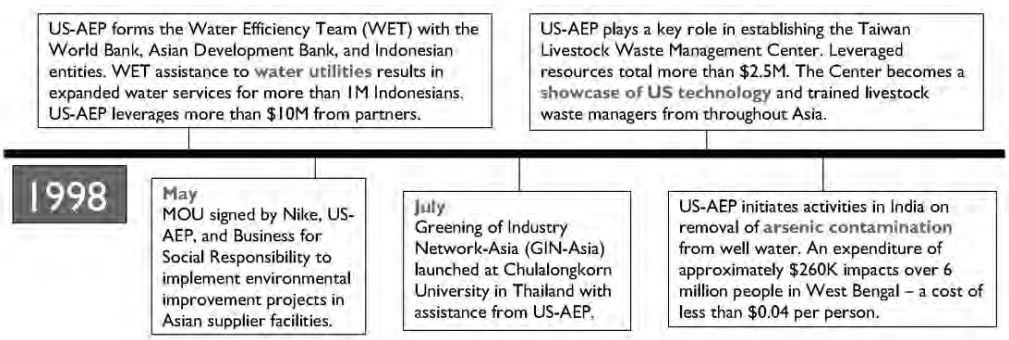


required to react quickly to implement new policies. Staff and partners noted several examples where US-AEP was able to greatly assist local officials in meeting these urgent challenges by flexibly providing technical assistance. For example, as the Government of Thailand moved to decentralize functions to provincial and local governments, local government officials became more directly responsible for implementing government programs, including implementing new directives regarding public participation in government decision-making on local environmental issues. US-AEP supported an activity that linked the City of Portland, Oregon and three Thai cities to assist these cities in developing public participation/public consultation procedures.

Although program flexibility helped leverage other resources and succeeded in promoting innovative and timely programming, staff and partners cautioned that a careful balance must be struck between flexible, rapid reaction to emerging needs and sufficient planning. Some US-AEP staff thought that when flexibility was overemphasized, programming lost the focus needed to ensure significant impact. Sufficient planning was also needed to allow for effective use of certain key project inputs. For example, it was sometimes difficult to quickly mobilize support from large institutional partners like the USEPA, who require significant lead time to arrange staff travel and prepare technical inputs.

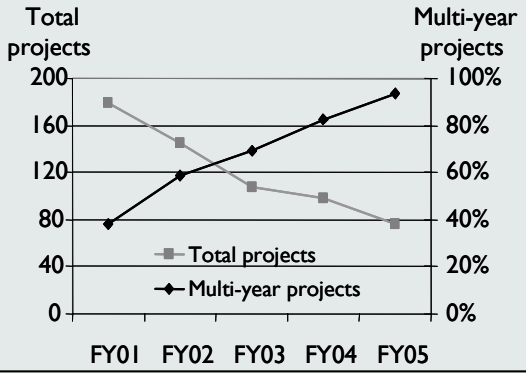
In addition, most staff and partners agreed that many of the more successful US-AEP supported initiatives were those involving long-term engagement and support. To successfully promote objectives like policy reform and institutional development, US-AEP needed to develop and follow through with long-term plans, strategies, and partner relationships. This notion is illustrated by the trend, over time, toward more complex, multi-year activities (see sidebar, following page). Consequently, although program flexibility was often useful, it was most successful when combined with careful planning and long-term commitment to particular initiatives.

Regional Nature: US-AEP was more than simply a number of individual country programs supported by a regional funding mechanism. Although each country program had unique characteristics and was designed in accordance with local priorities, the US-AEP regional framework allowed for efficient and effective use of many program resources, particularly U.S.-based inputs like those from USEPA. Country programs also benefited greatly from intra-regional sharing of experience and expertise and joint programming in common areas.



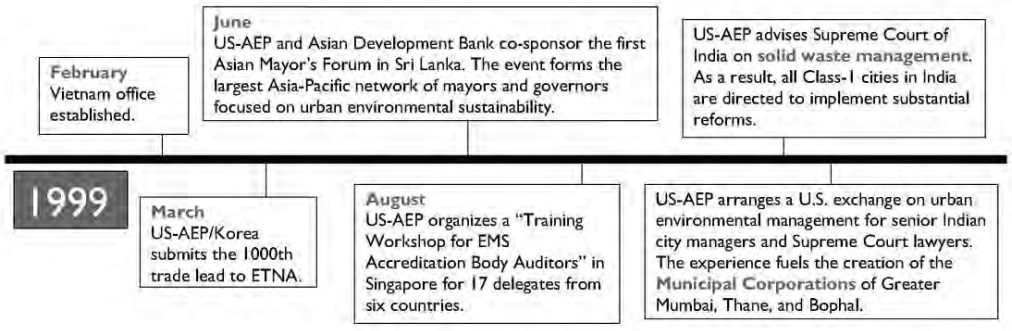
Trend toward more substantial activities: FY 2001 to 2005 US-AEP country work plans name over 350 supported activities. Over time, however, the number of activities US-AEP supported annually shrank from a high of 180 in 2001 to fewer than 80 in 2005. While the number of supported activities shrank, the nature and extent of activity support evolved. Fewer one-year/one-off activities were supported and instead support grew for multi-year activities (see graphic). This programming change began after the withdrawal of DOC from the program as US-AEP became more aligned with USAID development objectives and trade and technology transfer were deemphasized. In addition, to develop these larger, more sustained initiatives, activities were increasingly supported using multiple funding mechanisms and involving multiple, interrelated components, e.g., combining capacity building with public awareness components and funding support via grants, technical assistance and exchanges. This multi-year, multi-faceted support led to many of the most significant and sustainable US-AEP activity outputs and impacts.

US-AEP activities (by year)



These intra-regional interactions grew in the program's final years as management of the program moved from Washington, D.C. to Bangkok and as the program became increasingly field-driven. One clear example of this growth in regional interconnectedness was the rise in the number of intra-regional exchanges. In contrast to the earlier years of the program, where most exchanges supported by US-AEP were Asia-to-U.S. exchanges, during the final five years more than 2,156 participants went on Asia-to-Asia exchanges, as compared with only 844 who went on Asia-to-U.S. exchanges. Some joint programming was also developed, e.g., the watershed management program support by U.S. counterparts from Maryland's Chesapeake Bay that linked on-going efforts in Thailand's Thachin River basin with similar efforts in the Philippines' Laguna Bay.

The opportunity to interact with Asian peers provided many important benefits, according to interviewed staff and partners. By visiting government and NGO workers confronting similar environmental challenges and economic and political constraints in other Asian countries, local partners were exposed to solutions that had already been tested in conditions more similar to their own that those in the U.S. and other developed countries. In addition, these local leaders developed a healthy sense of competition with their Asian peers. After observing the implementation



of new policies or improved management practices and technological solutions in other countries, exchange participants often came home asking, "If they can do it why can't we?"

Some of the most successful US-AEP-supported regional initiatives have become institutionalized through the establishment of networks and regular conference gatherings. Important networks that have evolved with the help of US-AEP include the Southeast Asian Water Utilities Network (SEAWUN) and the Asian Environmental Compliance and Enforcement Network (AECEN). Other US-AEP supported regional gatherings of note included the Mayors Asia Pacific Environmental Summit (MAPES), the Clean Air Initiatives-Asia's Better Air Quality (BAQ), and Asia Pacific Roundtable for Cleaner Production (APRCP) conferences.

To identify opportunities for such complimentary regional programming and derive the greatest benefit from this cooperation, program staff and partners stressed the need to *actively* foster regional interactions between program staff and key partners. Cross-fertilization between country programs was typically spawned when staff and partners had opportunities to gather regionally for meetings, conferences, or exchanges. Some staff and partners felt that opportunities for productive regional interaction were insufficient. Often when regional gatherings did take place, some of the interviewees noted that time was primarily allotted for program management issues, with too little time was left for developing regional cooperation. Some suggested that formalizing more regular communication between staff and partners from the different implementing countries would also have been helpful.

US-AEP co-sponsored Mayors' Asia Pacific Environmental Summits (MAPES) in 2001 and 2003, which provided excellent networking opportunities and a public platform for mayors to commit to improving urban environmental conditions in the region.

At the same time, program participants also found that the most successful regional initiatives were those that developed out of self-defined, country-specific needs and demands. Initiatives driven largely by the interests of outside partners often had difficulty developing consistently at the local

level. Thus, the benefits of the regional nature of the program were most fully realized when a healthy balance was struck between sufficient attention to country-specific needs and active promotion of complimentary regional cooperation and interaction.

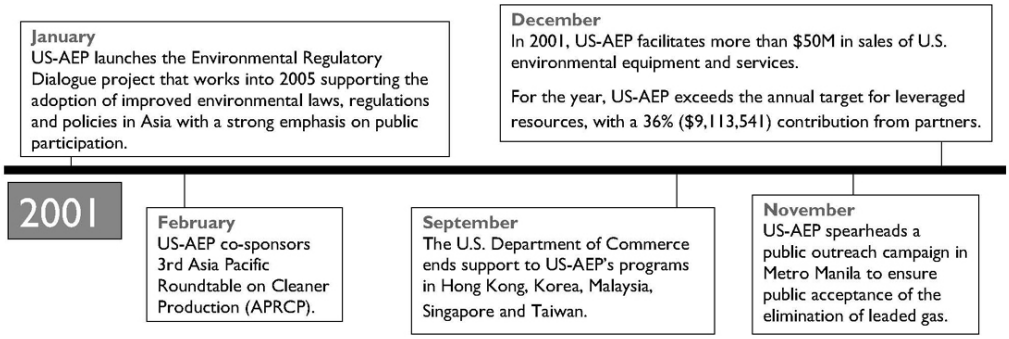
Partnership Approach: US-AEP promotion of partnerships between U.S. and Asian counterparts proved highly successful in addressing technically complex environmental pollution problems in Asia. US-AEP support of in-country partnering was also found to be effective in forging the local cooperation necessary to overcome these challenges. In fact, local-level, multi-stakeholder efforts and related promotion of public participation were hallmarks of the most highly regarded US-AEP projects.

Over the years many different types of partnerships were facilitated by US-AEP. Staff categorized US-Asia partnerships as primarily of two types: (1) professional peer-to-peer partnerships between private sector and public sector professionals, e.g., the partnership between the American Water Works Association (AWWA) and regional peers in the water utility industry that worked to improve technical and management training in several countries; and (2) government-to-government partnering, e.g., the partnering between USEPA and government environmental agencies in the region that worked to advance enforcement and regulation. As noted above, US-AEP also increasingly supported many effective Asia-to-Asia partnerships in later years. Such partnerships also included both professional and government pairings.

All US-AEP staff interviewed agreed that identification of the "right" local Asian partners was essential to US-AEP project success. To be sustainable, projects needed to be supported by knowledgeable, qualified and committed partners who could champion the projects over time. This commitment over the long-term was important as partnerships often took time to develop and mature before they became most effective. In attempts to identify local partners, the presence of US-AEP in-

"Through our partnership with Portland State University and US-AEP, we introduced new methods for community participation in cleaning up the canals in Ho Chi Minh City. We value Portland communities, businesses, and citizens as true partners in helping us achieve our mission to create a cleaner city."

DR. LAM MINH TRIET, DIRECTOR INSTITUTE FOR ENVIRONMENT AND RESOURCES, VIETNAM NATIONAL UNIVERSITY



country program staff was considered essential. In particular, most interviewees believed that the participation ofUS-AEP staff in partnership development was especially effective, particularly when dealing with potential local government partners.

The most highly valued U.S. partners were described by interviewees as those most committed to following through in building long-term relationships in Asian countries. In addition, interviewees cited U.S. partners with a high-level of technical expertise as the most valued. The most effective U.S. partners also were those who dealt with problems in their own work that were similar in scale to the problems faced by their Asian counterparts, e.g. U.S. state organizations paired with smaller Asian countries, and municipal government officials that worked with Asian city government counterparts.

Regardless of whether partners were from Asia or the U.S., interviewees generally agreed that the most effective partners typically had a mix of good technical and management capabilities, and the ability to communicate effectively at the international level. They also were familiar with overarching cultural, political, and economic realities in Asia and possessed the ability to think "outside the box" in an adaptive and innovative manner. In addition, effective partners had access to internal resources sufficient to wait out project ramp-up or delays. Consistency in the participation of staff involved in partnership activities was also noted as being particularly important. As the Country Manager from US-AEP/Vietnam said, "Partnerships are people." The key role that particular committed individuals played in building and maintaining effective US-AEP partner relationships cannot be overstated.

While identifying many characteristics of good partners, US-AEP staff and partners found it difficult to define a universal "good partner." Interviewees noted that the success of partnerships typically depended on proper alignment of partner interests and project objectives. It was important when potential partners were identified that US-AEP evaluated their organizational goals to forecast how these organizations might respond to a partnership proposal. US-AEP then would try to "sell" the partnership concept to them by highlighting the benefits they would derive from participation. Activities would ultimately only be developed if organizations or individuals were clearly sold on the benefits of partnering.

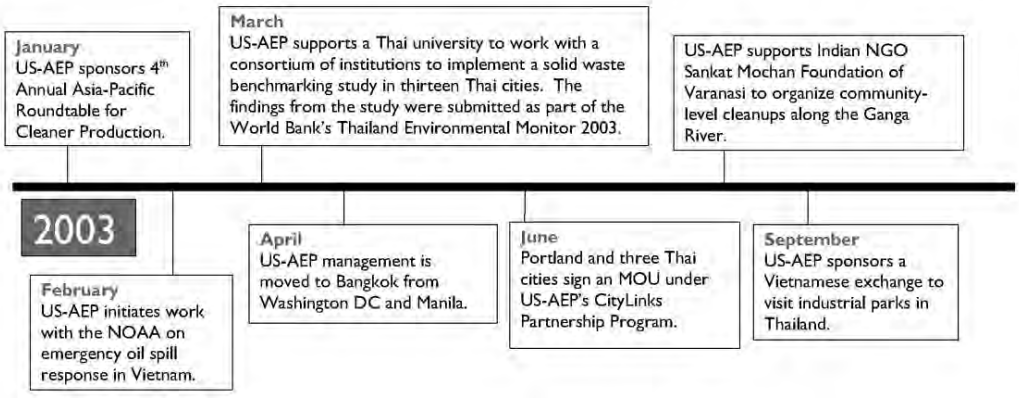
Although partnering was a central and important program characteristic, staff stressed that the objective of partnership development should not be partnering itself, but rather a clearly

targeted result that all involved are committed to achieving. Similarly, US-AEP staff viewed the goal of trying to develop sustainable partnerships (an explicit goal in the US-AEP results reporting framework) to be relevant only if there was a specific purpose, e.g., building network partnering like SEAWUN to enable long-term cooperation on regional training and certification. The idea expressed by some was that it was always important to "put issues first, not partnering." In the program's attempts to promote such sustainable, long-term partnerships, it was found that the commitment of key individuals was essential in building up the relationships over time to the point were they could become institutionalized.

It was often challenging for US-AEP staff to find local partners that fully fit the desired partner criteria. As an alternative, US-AEP sometimes attempted to engage existing partners in new tasks outside, but related to, their current capabilities while supporting organizational capacity building through training, instruction on international business protocols, and promotion of professional association linkages (both national and international). For example, in India, US-AEP worked with a long-time local NGO partner to introduce voluntary environmental reporting through the Global Reporting Initiative (GRI), an international movement to promote standardized public reporting of environmental performance by industry. US-AEP supplied a U.S. expert to work with NGO staff to develop and present training to local industry on GRI principles. The NGO now has the know-how, as well as a set of training materials, to continue these efforts on its own, and has started to engage with the international GRI organization.

Some staff thought that efforts to build the capacity of current and potential local partner organizations should have been a more central programmatic goal. These activities could have helped various organizations become more active internationally and develop professionally. Important professional skills that interviewees suggested US-AEP could have more actively helped develop in its local organization and individual partners included building capabilities to analyze technological needs, use critical thinking to propose solutions and assess proposed solutions using sound scientific criteria. One successful example cited of a case where US-AEP was able to build local capacity was US-AEP/Sri Lanka work with the Industrial Services Bureau (ISB). By engaging with ISB in a series of related activities over a number of years, US-AEP has help the ISB build capacity in a number of areas, including wastewater management and cleaner and more efficient power generation.

Even while noting this one area for improvement, most interviewees felt that US-AEP did an excellent job of developing many U.S.-Asia and Asia-Asia links between key environmental



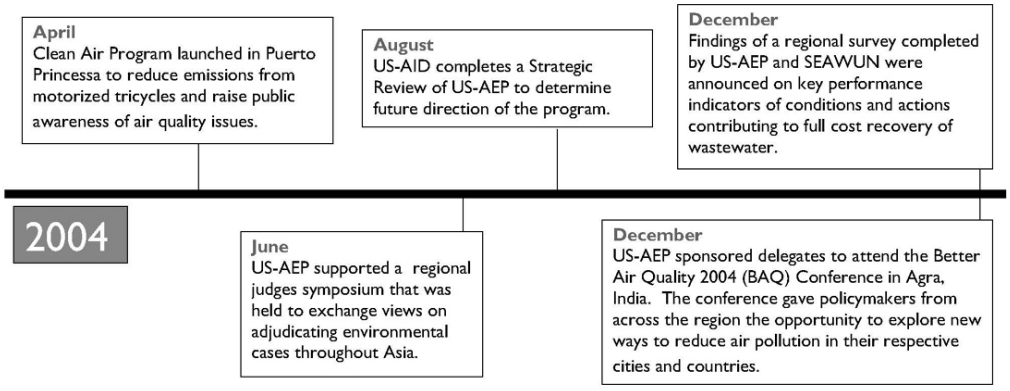
policy makers, technical specialists, and organizations that will result in successful on-going cooperation. Most also felt that the US-AEP exchange mechanism was particularly useful in this regard.

Use of Exchanges: An important element of partnership development was the opportunity for partners to meet face to face, an opportunity that was made possible through exchanges. Exchanges were defined as including the multitude of US-AEP-supported activities that brought people together to learn from one another. Through international and in-country travel, US-AEP supported the participation of environmental professionals in study tours, conferences, training programs, videoconferences, and consultations that allowed them to learn from, and be inspired by, counterparts with whom they could not ordinarily interact.

Many of those interviewed felt that effective use of the popular exchange mechanism was integral to development of US-AEP's favorable image in the region. Closely tracked participant feedback from US-AEP exchanges was consistently very positive. Given their central role in US-AEP and the fact that exchanges are rarely a central element of other donor programs in Asia, many Asian partners even came to view exchanges as the essence of the US-AEP program. As one Vietnamese partner put it, "US-AEP is exchanges." US-AEP staff did not, however, share this view; few of them ranked exchanges as an "essential" program characteristic. At the same time, most of these same staff viewed the interactions that exchanges allowed as vital to the achievements made by many US-AEP initiatives.

Exchange to Maryland under the Chesapeake Bay-Laguna Bay-Thachin River Partnership

US-AEP staff provided many examples of the significant impact that exchanges had on participants. Exchanges often motivated participants to begin attempts to adopt new technologies or policies once they returned from visits. For example, a group from the Philippines visited the U.S. and learned about the effective role that an association of solid waste management professionals had played in improving solid waste management practices in North America. Upon returning to the Philippines, several of the participants began efforts to form the Solid Waste Association of the Philippines (SWAPP), an organization initially supported by US-AEP but now operating on a self-sustained basis.



Mayor Mary Jane Ortega, one of SWAPP's founders and an exchange participant, has said the impact of exchanges in terms of "idea generation is super important."

Staff and partners felt that the most successful exchanges were those where extensive pre-planning was conducted. The best exchanges involved carefully identified participants who were prepared to actively participate in the exchange, and the right hosts who were well briefed on exchange objectives. Careful logistical work was also very important. As exchanges were often used to bring together senior policy makers to help build consensus on new policy initiatives, a missed airport pickup or lack of proper translation services could severely compromise the success of an otherwise well-structured exchange.

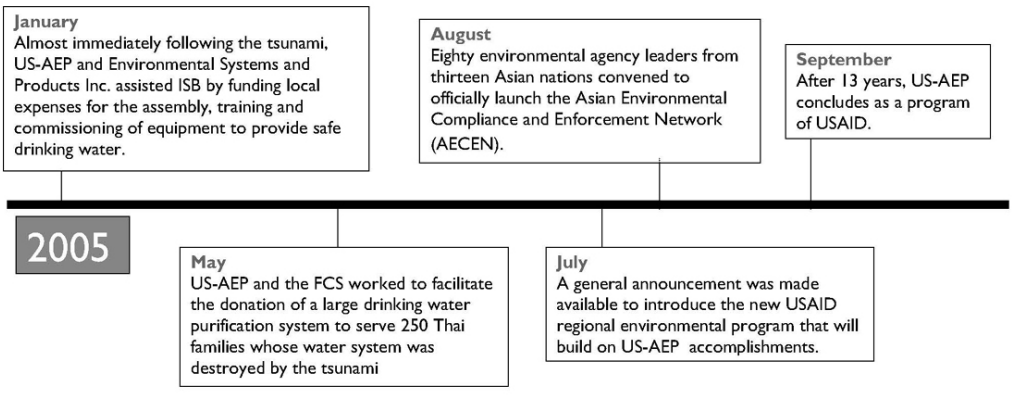
The most effective exchanges were also those that involved active and substantive follow-up. When US-AEP strategically supported follow-up activities through small grants and technical assistance, many successes resulted. Here again, as elsewhere in the program, a sense of balance was important – balanced use of a popular mechanism with focused follow-up using other program resources.

Other Important Program Characteristics:

In addition to the five key program characteristics discussed above, several US-AEP staff and partners mentioned two other important program characteristics: the US-AEP "brand" and the country-level US-AEP staff who worked on the program. Interviewees identified the US-AEP brand as the high profile and favorable reputation that US-AEP had developed over the years and enjoyed in the region. As a result of its long history, active engagement with local partners, and unique exchange support, US-AEP staff and implementing partners often found it easier to establish new partner relations or undertake new initiatives than it might have been, had they been promoting a relatively unknown entity. Interviewees also believed that having US-AEP staff working directly out of USAID offices helped to open doors locally, especially when dealing with local government partners.

CONCLUSION – STRIKING A BALANCE

Through over a decade of support to Asian countries, US-AEP made significant and often critical contributions to improving environmental conditions. Five program characteristics were found to be the most frequently cited as contributing to this success: ability to leverage other resources; programming flexibility/opportunism; regional program implementation; partnership approach; and use of exchanges. A central theme that emerged in discussions with US-AEP staff, and implementing and local partners was the notion of the

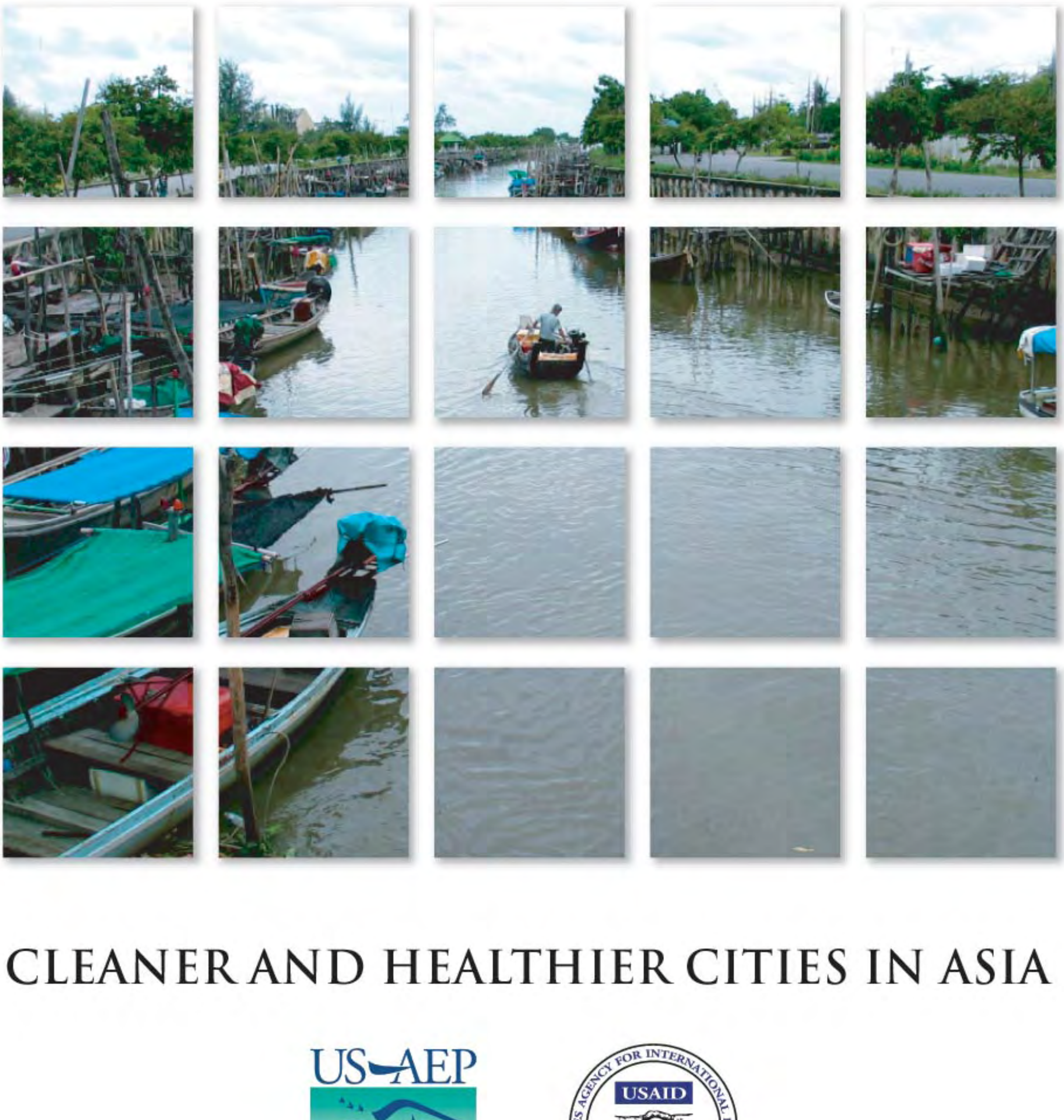


importance of carefully balancing application of the program's distinct features. In particular, it was important to balance:

- A flexible and responsive programming approach with sufficient planning and long-term commitment to important initiatives;
- Responsiveness to local, individual country needs with attention to regional and partner synergies;
- An emphasis on partnership building with attention to critical issues; and
- Use of exchanges with focused follow-up linked to other program resources.

On the whole, interviewees believed that US-AEP programs did a good job of achieving balance among the above elements. The move over time toward more complex, multi-year activities as the program matured made achieving that balance even more critical to the ultimate success of US-AEP initiatives.

UNITED STATES - ASIA
ENVIRONMENTAL PARTNERSHIP



CLEANER AND HEALTHIER CITIES IN ASIA

US-AEP
A Program of USAID

USAID
UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

UNITED STATES - ASIA
ENVIRONMENTAL PARTNERSHIP

Environmental Challenges

The **United States-Asia Environmental Partnership (US-AEP)** is a regional program of the **U.S. Agency for International Development (USAID)** that supports cooperation between governments, businesses, and communities in Asia and the U.S. to address the environmental challenges associated with urbanization and industrialization. Working in India, Indonesia, the Philippines, Sri Lanka, Thailand, and Vietnam, US-AEP introduces policies, practices and technologies that improve environmental conditions for city dwellers throughout the region, with a particular focus on the urban poor. By working toward cleaner and healthier cities, US-AEP also promotes sustainable economic growth and an improved quality of life for the people of Asia.

Creating Sustainable Solutions through Partnerships

US-AEP offers a valuable means for six Asian countries to share lessons and develop solutions that significantly affect the region. US-AEP achieves its environmental objectives by providing flexible and fast responses to high priority opportunities. Through grants, technical assistance and exchanges, US-AEP brings practitioners and experts together to address specific problems and share experiences in the areas of:

- Air quality
- Water quality and supply
- Environmental governance
- Solid and hazardous waste management
- Energy efficiency and renewable energy

Maximizing Impact through Regional Cooperation

US-AEP facilitates sharing of regional best practices that can be adopted to address country-specific needs. In addition to US-Asia partnerships, the program supports regional dialogue and action on common environmental problems by replicating successful projects, sharing best practices, creating and strengthening networks that promote dialogue and cooperation, and building stakeholder capacity for achieving consensus.

UNITED STATES - ASIA ENVIRONMENTAL PARTNERSHIP

Cleaning the Air

Growth in the transport, power, and manufacturing sectors in many Asian countries has worsened air quality, contributing to respiratory and other health-related problems. In Indonesia, leaded gasoline is the primary source of childhood lead poisoning. Urban air pollution causes as many as 2,300 premature deaths and 9,600 cases of chronic bronchitis annually in Thailand. Pollution from industrial sources is also a major public health concern throughout the region. US-AEP develops and supports partnerships with governments, businesses and communities to improve air quality in Asia by promoting the use of cleaner fuels, helping cities develop air quality management plans, improving vehicular inspection and maintenance programs, and providing technology solutions. US-AEP also collaborates with the Asian Develpment Bank and the World Bank on the Clean Air Initiative for Asian Cities (CAI-Asia), a regional program to share knowledge on air quality management, improve policy and regulatory frameworks, and assist cities in implementing integrated air quality strategies. Below are representative program accomplishments from each US-AEP country.

INDIA

- Improving urban air quality through science-based air pollution control strategies and policies, including emissions inventory modeling and air quality monitoring.

INDONESIA

- Promoting the phase-out of leaded gasoline nationwide, and expediting adoption of cleaner EURO-II vehicle technology and emission standards.
- Monitoring health impacts and benefits of air quality improvement programs.

PHILIPPINES

- Developing a replicable pilot program in the cities of Puerto Princesa and San Fernando (La Union) to reduce emissions from tricycles, a major source of air pollution in cities throughout the Philippines.
- Implementing a media campaign to increase public awareness on the health impacts of air pollution due to excessive tricycle emissions.

SRI LANKA

- Contributing to the nationwide phase-out of leaded gasoline and a subsequent 80 percent reduction in ambient lead levels in Colombo.
- Supporting the implementation of the national Clean Air Action Plan through stakeholder consultations focused on reducing emissions of particulate matter and sulfur oxides from vehicles.

THAILAND

- Implementing policy and technology solutions to reduce harmful emissions from diesel vehicles in collaboration with Thailand's Pollution Control Department, the Department of Land Transport, and the World Bank.

VIETNAM

- Promoting the adoption of tighter fuel and vehicle emissions standards, promoting best practices in vehicle inspection and maintenance, and improving air quality monitoring in Hanoi and Ho Chi Minh City.

CLEANER

Supporting
Clean Water Initiatives and Better Sanitation Systems

Water availability and quality are paramount issues in Asia. Urban demand for water in India exceeds supply by as much as thirty percent. With over three quarters of the population lacking adequate sanitation, water-borne diseases are prevalent, including diarrhea, which kills 500,000 children each year. In Indonesia, it is estimated that less than 40 percent of the urban population has access to clean, piped water. US-AEP is helping Asian countries improve water quality and increase access by upgrading the accountability and efficiency of local government institutions providing services to consumers and by undertaking watershed planning activities with local communities. In addition to the initiatives described below, US-AEP also works with regional bodies such as the Southeast Asia Water Utilities Network (SEAWUN) to promote full cost recovery as a means of improving the quality of water utility services.

INDIA

- Supporting rainwater harvesting programs as a simple and cost effective solution to increase water supply and eliminate shortages in Mumbai, Kolkata, and in the Jalore district of Rajasthan.
- Developing water recycling and reuse models for cities in three Indian states.

INDONESIA

- Training water enterprise managers and wastewater treatment operators to improve basic skills and increase their ability to provide the urban poor better access to clean, piped water.
- Working with communities to reduce water contamination and improve waste management.

PHILIPPINES

- Assisting four cities to establish effective, low-cost wastewater treatment facilities to reduce water pollution through innovative financing schemes.
- Improving implementation of the Clean Water Act by sharing international best practices, supporting wider consultations on its implementing rules and regulations, and pilot testing establishment of water quality management areas.

SRI LANKA

- Engaging school children and communities to better understand the health implications of poor water quality.
- Improving water pumping, treatment and supply efficiency to enhance access to clean water.

THAILAND

- Developing community-based solutions to revitalize the Tha Chin River basin, one of Thailand's largest watersheds and a major source of drinking water.
- Developing models for local action through partnerships with the Laguna Lake Development Authority in the Philippines, the University of Maryland, environmental NGOs in the Chesapeake Bay region, and other Maryland and Thai stakeholders.

VIETNAM

- Mobilizing community support to clean up the Tan Hoa-Lo Gom Canal, a heavily polluted watershed serving over 1 million people in Ho Chi Minh City.
- Developing models for local action through international partnerships with the City of Portland Oregon, Portland State University, NIKE and others.
- Sharing lessons with governmental stakeholders in Thailand, the Philippines, and the Mekong Delta.

AND HEAL

Improving Solid and Hazardous Waste Management

Solid and hazardous waste management is a serious challenge in urban areas throughout Asia. While hazardous waste can directly pose a serious threat to the health of populations, the indiscriminate dumping of solid waste in waterways pollutes major sources of drinking water for millions of people. Only forty percent of solid waste is collected in the Philippines while the rest is dumped into waterways and open spaces, and nearly 2.5 million tons of hazardous waste are generated each year. Increasingly evident in Vietnam's cities are signs of municipal and household wastes in rivers and lakes, and untreated industrial pollution in close proximity to residences, rice paddies, and schools. US-AEP is helping address these challenges by strengthening the capacity of local governments to develop plans, prepare solid waste projects, and promote composting and recycling technologies.

INDIA

- Introducing best practices for treatment and disposal of municipal solid waste, hazardous waste, and bio-medical waste, and increasing private sector participation in solid waste management.
- Increasing awareness among citizens, local governments, regulators, and industry of solid waste management practices to increase compliance with laws and regulations.

INDONESIA

- Building a public information dissemination center for prevention of lead poisoning and improved hazardous waste management.
- Providing public information about safer mining practices and the dangers of mercury through partnerships among civil society and local governments.

PHILIPPINES

- Assisting local governments establish sustainable funding mechanisms such as garbage collection fees for solid waste management projects.
- Conducting training on hazardous waste management for government agencies and assisting in the development of a chemical and hazardous waste emergency response program.

SRI LANKA

- Creating public-private partnerships and providing technical assistance to: process municipal waste in Colombo; support a community model to recycle plastic and make compost and biogas in Galle; and introduce technology to produce methane from brewery wastewater.

THAILAND

- Promoting continuous improvement in solid waste management through benchmarking of performance and service levels of current practices for thirteen municipalities.

VIETNAM

- Increasing the efficiency of solid waste collection in Ho Chi Minh City through improvement in the legal framework for greater involvement of the non-public sector.
- Assisting government and industry to properly manage and dispose of hazardous wastes, particularly Persistent Organic Pollutants (POPs).

Strengthening Environmental Governance

Government policy plays a vital role in addressing environmental challenges throughout the region. While major legislation on clean air, solid and hazardous waste management, and clean water has been enacted in many Asian countries, enforcement and compliance remain major challenges. Industrial facilities in Vietnam operate within a weak regulatory framework while civil society and local communities have limited power and influence in addressing environmental concerns. Thailand has a new constitution that mandates improved environmental governance and is now tasked with decentralizing the decision-making process and empowering local governments and citizens to participate in protecting the environment. US-AEP is working with partners throughtout Asia to strengthen environmental compliance, involve citizens in environmental decision making, and promote policies that result in real solutions to environmental concerns. US-AEP is also collaborating with the Asia Development Bank, World Bank, and OECD on development of a regional environmental compliance and enforcement network linking key Asian and U.S. officials and practicioners.

INDIA

- Demonstrating successful models of citizen involvement in environmental decision making through the Civil Society Partnership Program, and promoting voluntary environmental management within industry.

INDONESIA

- Strengthening institutional coordination among authorities influencing air quality management through a regulatory consultation and review process in Medan, Makassar, Pontianak, and Jakarta.
- Encouraging transparency in energy regulation toward a competitive market for cleaner fuels.

PHILIPPINES

- Strengthening enforcement of environmental regulations through decentralization and pilot testing of improved procedures.

SRI LANKA

- Strengthening municipal environmental governance through stakeholder participation, adoption of international best practices/techniques, and increased use of digital maps and information communication technology.

THAILAND

- Preventing and resolving environmental disputes through mediation training and the establishment of a mediation center of excellence.
- Strengthening court capabilities in the environment through establishment of a “Green Bench” and judges training.

VIETNAM

- Piloting “polluter pays” approaches to waste water management in Hanoi.
- Assisting the Ministry of Natural Resources and Environment with implementation of the Law on Environment, and strengthening environmental compliance and enforcement capacity.

ES IN ASIA

CLEANER & HEALTHIER CITIES IN ASIA

United States-Asia Environmental Partnership

US-AEP
A Program of USAID

Environmental Partnerships

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Sustainable Solutions

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- Air quality
- Water supply and wastewater treatment
- Environmental governance
- Hazardous and solid waste management
- Industrial environmental management
- Energy efficiency and renewable energy

Regional Cooperation

US-AEP facilitates US-Asian solutions that address country specific needs. The program also supports regional dialogue and action on common environmental problems by helping to replicate successful projects, sharing best practices, creating and strengthening networks that promote dialogue and cooperation, and strengthening stakeholder capacity for consensus building.

Helping Communities Improve Water Quality

US-AEP is mobilizing communities and strengthening local governments to improve water quality in Asia. The program is introducing community-based environmental management (CBEM) to government officials, private sector leaders and citizen groups in the Tha Chin River Basin in Thailand, the Laguna Lake region in the Philippines, and around a major canal in Ho Chi Minh City. US-AEP has actively promoted dialogue among stakeholders in each of the countries, organized cross-country exchanges to facilitate sharing of lessons learned and exposed stakeholders to best practices from the Chesapeake Bay in the United States. Recently, a group of community leaders from the Tha Chin river basin visited the Philippines to learn from counterparts at Lake Laguna. Inspired by their visit, four provincial river councils are now undertaking action planning and outreach campaigns.

PROGRAM ACCOMPLISHMENTS

United States-Asia Environmental Partnership

Cleaning the Air

Philippines: Reducing emissions from three-wheelers in the city of Puerto Princesa.

Indonesia/Vietnam: Phasing-out of leaded gasoline.

Sri Lanka/Thailand/Vietnam: Promoting a nationwide emissions and fuels standards program.

India: Introducing science-based air quality management tools.

Supporting Clean Water Initiatives and Better Sanitation Systems

Indonesia: Initiating a pilot project that was later expanded by USAID funding to provide treated piped water to more than one million Indonesians.

India/Philippines: Introducing low-cost sanitation and wastewater treatment systems to local governments.

Vietnam: Improving response readiness to oil spills in the Saigon River estuary.

Improving Solid and Hazardous Waste Management

Sri Lanka/Vietnam: Facilitating public-private partnerships to improve the collection and disposal of municipal solid waste.

Philippines: Training government personnel in hazardous waste management practices.

India/Vietnam: Improving compliance with hazardous waste disposal regulations.

Reducing Industrial Pollution and Promoting Energy Efficiency

Vietnam/Philippines: Introducing Responsible Care, a voluntary environmental program with the chemical industry.

Thailand: Drafting and promoting a law for renewable energy generators.

Philippines/Sri Lanka/India: Introducing energy efficiency strategies for water utilities.

Strengthening Environmental Governance

India/Indonesia/Sri Lanka/ Philippines/Thailand/Vietam: Establishing an Asian legal practitioner network to strengthen environmental enforcement capabilities.

Thailand/Vietnam: Developing procedures for consensus-building among Mekong River countries.

Philippines/Thailand/Vietnam: Facilitating community-based partnerships for watershed restoration.

Philippines: Advocating for the recently enacted Clean Water Act.

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CLEANER & HEALTHIER CITIES IN ASIA

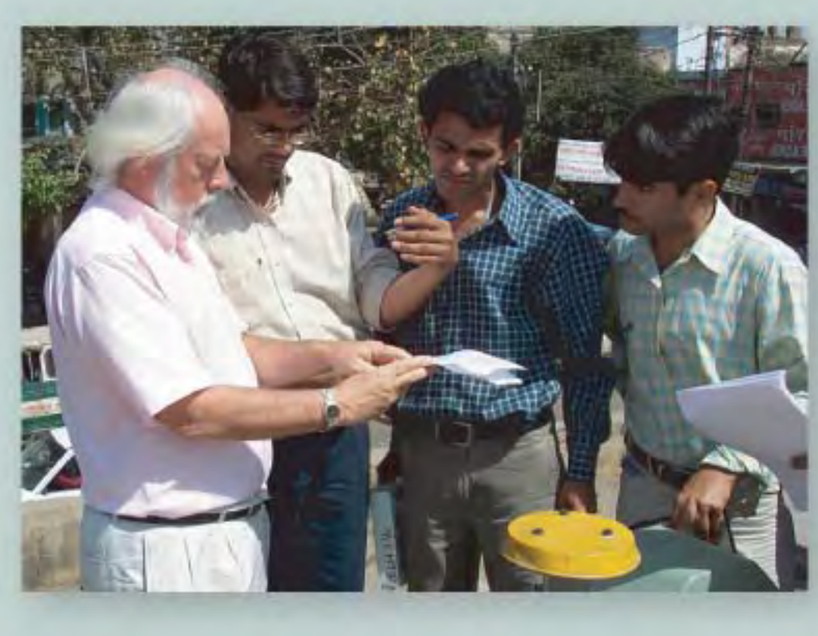
US-AEP INDIA

Facilitating Cooperation to Solve Environmental Problems

The **United States-Asia Environmental Partnership (US-AEP)** is a regional program of the **U.S. Agency for International Development (USAID)** that supports partnerships between governments, businesses, and communities in Asia and the U.S. to address the environmental challenges associated with urbanization and industrialization. Working in **India, Indonesia, the Philippines, Sri Lanka, Thailand,** and **Vietnam**, US-AEP introduces policies, practices and technologies that improve air and water quality, waste management, resource efficiency, and environmental governance. By working toward cleaner and healthier cities, US-AEP also promotes sustainable economic growth and an improved quality of life for the people of Asia.

Sustaining Program Initiatives by Strengthening Partnerships

US-AEP builds and nurtures partnerships that bring experts and practitioners from Asia and the U.S. together to develop and implement practical solutions to environmental problems. By strengthening partnerships between governments, non-governmental organizations, academia, and the private sector, US-AEP improves the capacity in India and the rest of Asia to sustain program initiatives.



Sharing Solutions for Greater Regional Impact

The six countries where US-AEP is focusing its efforts share many of the same environmental problems — declining air and water quality, inadequate solid and hazardous waste management, and a need for stronger environmental governance. Through US-AEP support, models proven effective in one place can be tailored to meet local needs elsewhere. US-AEP generates solutions using targeted technical assistance, small grants, and educational exchange activities. The program has connected more than 4,000 people from India, the U.S. and Asia, encouraging greater collaboration to face environmental challenges.

SUCCESS STORIES

Cleaner Air for Kolkata Residents

400,000 people living near the largest private thermal power company in Eastern India - the Calcutta Electric Supply Corporation (CESC) - were breathing air highly polluted by emissions from the company's 50 year-old, coal-fired power plant. Emissions from fossil fuel combustion, especially coal combustion, are major contributors to air pollution in India. The effects of this pollution on human health can be devastating, leading to potentially fatal respiratory diseases and heart problems among urban dwellers. US-AEP facilitated a commercial agreement between CESC and a small New Jersey-based company, Beltran Associates, Inc., that produces a proprietary particulate reduction technology. Under this agreement, a pollution control system was installed for the first of CESC's eight coal-fired plants in December 2003, reducing particulate emissions substantially to a level below the regulatory standard. Not only are CESC's 400,000 neighbors now breathing cleaner air, the reduction of particulate matter has allowed the facility to remain open and continue to offer jobs to 700 local residents.

"The application of this technology will help the local people breathe cleaner air and reduce concerns from environmentalists."

Subhas Datta
Howrah Democratic Citizen's Forum

United States-Asia Environmental Partnership
INDIA

Environmental Challenges in India

Water availability and quality are paramount issues in India with urban demand for water exceeding supply by as much as 30 percent. With over three quarters of the population lacking adequate sanitation, water-borne diseases are prevalent, including diarrhea, which kills 500,000 children each year. Air pollution and improper waste disposal are also major concerns. Growth in the transport, power, and manufacturing sectors has worsened air quality, contributing to respiratory and other health-related problems. Solid waste management, including the indiscriminate dumping of hazardous waste, is a critical problem. While India's demand for energy is among the fastest growing in the world, investments in power generation, transmission, and distribution have not kept up with demand. US-AEP works with the government, private sector, and civic groups in India to build the local capacity needed to meet environmental challenges and share in sustainable growth. The program also supports ongoing cooperation between the U.S. Environmental Protection Agency and the Indian Ministry of Environment and Forests on a range of environmental issues.

Cleaning the Air

- Helping cities and regulators improve air quality management using science-based air pollution control strategies and tools.
- Working with municipalities, regulators, multilateral agencies, and the private sector to promote enhanced inspection and maintenance programs and the use of clean fuels and vehicles across India.

Supporting Clean Water Initiatives

- Supporting water quality improvement initiatives and management best practices at the state and local level.
- Promoting best practices for water conservation such as rain water harvesting and wastewater recycle-reuse.
- Introducing new water, wastewater, and industrial effluent treatment technologies.

Improving Solid and Hazardous Waste Management

- Supporting the effective management and treatment of solid waste through increased public awareness and local government capacity building.
- Improving compliance with hazardous waste disposal regulations and working with states and municipalities to establish treatment and disposal facilities.

Advancing Energy Efficiency

- Assisting state and municipal governments to improve the management of energy and water resources.
- Encouraging the adoption of voluntary energy effeciency best practices by industry.
- Promoting the use of renewable energy.

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CLEANER & HEALTHIER CITIES IN ASIA

US-AEP INDONESIA

Facilitating Cooperation to Solve Environmental Problems

The **United States-Asia Environmental Partnership (US-AEP)** is a regional program of the **U.S. Agency for International Development (USAID)** that supports partnerships between governments, businesses, and communities in Asia and the U.S. to address the environmental challenges associated with urbanization and industrialization. Working in **Indonesia, Vietnam, India, the Philippines, Sri Lanka, and Thailand,** US-AEP introduces policies, practices and technologies that improve air and water quality, waste management, resource efficiency, and environmental governance. By working toward cleaner and healthier cities, US-AEP also promotes sustainable economic growth and an improved quality of life for the people of Asia.

Sustaining Program Initiatives by Strengthening Partnerships

US-AEP builds and nurtures partnerships that bring experts and practitioners from Asia and the U.S. together to develop and implement practical solutions to environmental problems. By strengthening partnerships between governments, non-governmental organizations, academia, and the private sector, US-AEP improves the capacity in Indonesia and the rest of Asia to sustain program initiatives.

Sharing Solutions for Greater Regional Impact

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Photo Courtesy of Joint Committee for Leaded Gasoline Phase Out (KPBB)

SUCCESS STORIES

Phasing Out Leaded Gasoline Across Indonesia

Photo Courtesy of University of Indonesia

Implementation of landmark legislation to phase out leaded gasoline throughout Indonesia has proven challenging. A US-AEP supported program to find solutions and put them into practice has made the difference and contributed significantly to lead phase-out in Jakarta, Bali, Batam and much of North Java. The program, led by the Joint Committee for Leaded Gasoline Phase-out (KPBB), facilitates engagement among civil society, government agencies and the private sector, provides information and training to demystify lead phase-out, and uses a science-based approach to gather data to monitor progress in 9 cities. Recommendations developed by KPBB have been adopted by the government. As of September 2004, forty percent of the national supply is lead free, reducing airborne lead exposure by 90 percent for 16 million people. In the rest of the country, lead levels in gasoline have been cut in half, reducing airborne exposures by an equal amount. The program recently established a Lead Information Center to provide information to the public on ways to avoid lead exposure.

United States-Asia Environmental Partnership

INDONESIA

Environmental Challenges in Indonesia

In the world's fourth most populous country, cities are rapidly growing, with urbanization estimated to reach up to 50 percent by 2010. The availability of clean water and sanitation is a critical challenge, as 61 percent of urban populations have no access to piped water. City dwellers also face air pollution levels that far exceed standards: in 2003 Jakarta's air was in the "healthy" range only 7 days. Use of leaded gasoline continues to contribute to child lead poisoning. Poor waste management is also a serious concern. New energy and emissions legislation offers opportunities for investment and improved enforcement, but stronger regulation and public participation is needed to realize the potential benefits. US-AEP is working with partners in government, civil society and the private sector to increase capacity to meet these challenges and achieve a healthier population and more productive economy.

Cleaning the Air

- Promoting nationwide phase-out of leaded gasoline and reducing childhood lead poisoning in Jakarta.
- Building a stronger constituency for clean fuels and clean air by providing neutral, science-based resources to policy makers concerning clean fuels and vehicle technology, emission standards, and vehicle inspection and maintenance programs.
- Monitoring health impacts of air pollution in Jakarta and assessing risks of target groups.

Photo Courtesy of Swisscontact

Supporting Clean Water Initiatives

- Training water enterprise managers and wastewater treatment operators to improve basic skills and increase their ability to provide the urban poor better access to clean, piped water.
- Working with local governments and communities to reduce water contamination through improved detection, regulation and waste management.
- Working with industry to reduce water contamination by introducing an environmentally sound way to clean sludge pits created by petroleum processing.

Photo Courtesy of USAID Indonesia

Advancing Energy Efficiency

- Engaging hotels and industry associations faced with rapidly rising energy costs in practical energy efficiency solutions to preserve competitiveness and help retain jobs.

Strengthening Environmental Governance

- Enhancing the role of civil society in environmental decision-making.
- Encouraging transparency in the energy regulatory body toward a competitive market that can provide access to cleaner fuels.
- Strengthening institutional coordination among authorities influencing air quality management.

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CLEANER & HEALTHIER CITIES IN ASIA

US-AEP PHILIPPINES

Facilitating Cooperation to Solve Environmental Problems

The **United States-Asia Environmental Partnership (US-AEP)** is a regional program of the **U.S. Agency for International Development (USAID)** that supports partnerships between governments, businesses, and communities in Asia and the U.S. to address the environmental challenges associated with urbanization and industrialization. Working in **the Philippines, India, Indonesia, Sri Lanka, Thailand,** and **Vietnam**, US-AEP introduces policies, practices and technologies that improve air and water quality, waste management, resource efficiency, and environmental governance. By working toward cleaner and healthier cities, US-AEP also promotes sustainable economic growth and an improved quality of life for the people of Asia.

Sustaining Program Initiatives by Strengthening Partnerships

US-AEP builds and nurtures partnerships that bring experts and practitioners from Asia and the U.S. together to develop and implement practical solutions to environmental problems. By strengthening partnerships between governments, non-governmental organizations, academia, and the private sector, US-AEP improves the capacity in the Philippines and the rest of Asia to sustain program initiatives.

Sharing Solutions for Greater Regional Impact

The six countries where US-AEP is focusing its efforts share many of the same environmental problems — declining air and water quality, inadequate solid and hazardous waste management, and a need for stronger environmental governance. Through US-AEP support, models proven effective in one place can be tailored to meet local needs elsewhere. US-AEP generates solutions using targeted technical assistance, small grants, and educational exchange activities. The program has connected more than 4,000 people from the Philippines, the U.S. and Asia, encouraging greater collaboration to face environmental challenges.

SUCCESS STORIES

The Clean Water Act - Diminishing Economic Losses

The Philippine Congress passed the Clean Water Act (CWA) in early 2004, marking a significant step towards addressing the continuing rapid degradation of the country's water quality. In recent years, poor water quality has resulted in an estimated annual economic loss of US $1.3 billion: $55 million in health, $310 million in fisheries production and $854 million in tourism. US-AEP has worked closely with the Philippine Congress and the Department of Environment and Natural Resources to incorporate international best practices into the Clean Water Act via technical exchanges, consultative workshops and observation programs to the U.S. US-AEP is also providing assistance in developing the CWA's implementing rules and regulations.

"Our partnership with US-AEP has been instrumental in developing the optimal policy mix for ensuring clean water for future generations of Filipinos through enactment of a sound Clean Water Act."

Congressman Augusto Baculio
Philippine House of Representatives

United States-Asia Environmental Partnership
PHILIPPINES

Environmental Challenges in The Philippines

Population growth, urbanization, and industrialization have created massive pressures on the environment and life support systems upon which all Filipinos depend. The nation faces environmental challenges on many fronts. Air pollution from vehicle and industrial sources is a major public health concern. Sixty-five percent of Filipinos lack access to proper sanitation/wastewater facilities and over one-third have no access to clean drinking water. Only forty percent of solid waste is collected while the rest is dumped into waterways and open spaces. Nearly 2.5 million tons of hazardous waste is generated each year. Major legislation on clean air, solid waste, and clean water has been passed into law, but enforcement remains a challenge. US-AEP is strengthening partnerships among national and local governments, non-governmental organizations and the private sector to address these growing environmental concerns.

Cleaning the Air

- Helping to develop a pilot program in Puerto Princesa to reduce emissions from tricycles, a major source of air pollution in cities throughout the Philippines.
- Working with civil society and the media to increase public awareness on the health effects of air pollution.

Supporting Clean Water Initiatives

- Testing low-cost wastewater treatment systems with four local governments.
- Sharing best practices on community-based water quality management.
- Developing operational efficiency strategies for the water district of Cebu and Iloilo.

Improving Solid and Hazardous Waste Management

- Assisting local governments implement sustainable financing to support waste management projects.
- Sponsoring training for Philippine government personnel to regulate and enforce the proper management of hazardous waste.
- Establishing a chemical emergency response program.

Introducing Industrial Environmental Management

- Promoting self-regulation through the Philippines Environmental Partnership Program.
- Institutionalizing the Greening the Supply Chain initiative.

Strengthening Environmental Governance

- Assisting in the development of effective implementing rules and regulations for the Clean Water Act.
- Improving the Department of Environment and Natural Resources' regional enforcement capabilities.
- Enhancing the capacity of the judiciary to handle environmental cases.

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CLEANER & HEALTHIER CITIES IN ASIA

US-AEP SRI LANKA

Facilitating Cooperation to Solve Environmental Problems

The **United States-Asia Environmental Partnership (US-AEP)** is a regional program of the **U.S. Agency for International Development (USAID)** that supports partnerships between governments, businesses, and communities in Asia and the U.S. to address the environmental challenges associated with urbanization and industrialization. Working in **Sri Lanka, India, Indonesia, the Philippines, Vietnam, and Thailand,** US-AEP introduces policies, practices and technologies that improve air and water quality, waste management, resource efficiency, and environmental governance. By working toward cleaner and healthier cities, US-AEP also promotes sustainable economic growth and an improved quality of life for the people of Asia.

Sustaining Program Initiatives by Strengthening Partnerships

US-AEP builds and nurtures partnerships that bring experts and practitioners from Asia and the U.S. together to develop and implement practical solutions to environmental problems. By strengthening partnerships between governments, non-governmental organizations, academia, and the private sector, US-AEP improves the capacity in Sri Lanka and the rest of Asia to sustain program initiatives.

Sharing Solutions for Greater Regional Impact

The six countries where US-AEP is focusing its efforts share many of the same environmental problems — declining air and water quality, inadequate solid and hazardous waste management, and a need for stronger environmental governance. Through US-AEP support, models proven effective in one place can be tailored to meet local needs elsewhere. US-AEP generates solutions using targeted technical assistance, small grants, and educational exchange activities. The program has connected more than 4,000 people from Sri Lanka, the U.S. and Asia, encouraging greater collaboration to face environmental challenges.

SUCCESS STORIES

Solid Waste Solutions Through Partnerships

The City of Colombo has an improved solid waste management system, thanks to a private collection system and a $6 million waste processing facility, which produces 100 tons of compost per day from about 900 tons of municipal solid waste. The low-priced, high-quality compost will help to improve soil quality in Sri Lankan agricultural areas. In 2001, US-AEP supported the formation of a public-private partnership between the City of Colombo and Burns Environmental Technologies Private Ltd. (BETL) that led to a 25-year contract to receive and process the city's waste. US-AEP provided BETL technical assistance through the University of Minnesota, and technical training in the USA. USAID/US-AEP also provided a state-of-the-art laboratory and field equipment to ensure the quality of compost made with mixed waste. By turning Colombo's garbage into valuable compost, this partnership is easing the city's waste issues and offering hope for other cities in the country. BETL is already taking waste from an adjacent city and plans to expand into eight additional cities.

"We are the first compost manufacturing facility in the country on a commercial basis and this is the biggest plant of its kind in south Asia."

Ravi Wijeratne
Managing Director, BETL

United States-Asia Environmental Partnership

SRI LANKA

Environmental Challenges in Sri Lanka

The recent ceasefire agreement to end an era of conflict in Sri Lanka brings with it many opportunities for economic development. The country has a unique opportunity to ensure that the renewed development is not accompanied by negative environmental impacts that often result from rapid urbanization and industrialization. US-AEP activities focus on reducing air pollution in major cities, improving the quality of, and access to, drinking water, managing municipal solid hazardous waste, promoting clean and efficient energy use and strengthening the participation of civil society in environmental decision making. US-AEP Sri Lanka works with the government, private sector, and civic groups to build the local capacity needed to meet environmental challenges in promoting sustainable growth.

Cleaning the Air

- Establishing an Air Resource Management Center and the Partnership for Clean Air, a new NGO in Sri Lanka.
- Introducing low sulfur diesel, and reducing ambient lead levels by 80% in Colombo through the phase-out of leaded gasoline.
- Introducing vehicle emissions standards and fuel quality and vehicle importation specifications.
- Developing the Sri Lanka Clean Air Initiative (2003-2007), a comprehensive national pollution reduction strategy.
- Benchmarking mobile emissions levels using remote sensing technology and building local capacity to establish vehicle emission testing as a public-private partnership.

Improving Solid and Hazardous Waste Management

- Facilitating a community-led micro financing system to promote citizen support for solid waste management.
- Building local capacity for waste reduction through composting and recycling.
- Piloting projects to use industrial solid waste and municipal waste to generate biogas.

Supporting Clean Water Initiatives

- Engaging communities to measure water quality and better understand the linkages between water quality, health and sources of pollution.
- Undertaking water resource assessments in the Kelani River basin, which provides drinking water to greater Colombo.

Promoting Energy Efficiency

- Benchmarking energy use patterns and practices in Sri Lankan hotels.
- Introducing energy audits and best practices in water and sewage pumping and street lighting.
- Implementing pilot projects to demonstrate the financial and technical viability of energy efficiency techniques and renewable energy.

Strengthening Environmental Governance

- Strengthening environmental governance and stakeholder participation at the municipal level.
- Establishing a model program to engage citizens and policy makers in environmental dialogue.
- Helping municipalities to improve management practices that increase revenue collection.

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CLEANER & HEALTHIER CITIES IN ASIA

US-AEP THAILAND

Facilitating Cooperation to Solve Environmental Problems

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Sustaining Program Initiatives by Strengthening Partnerships

US-AEP builds and nurtures cooperation that bring experts and practitioners from Asia and the U.S. together to develop and implement practical solutions to environmental problems. By strengthening partnerships between governments, non-governmental organizations, academia, and the private sector, US-AEP improves the capacity in Thailand and the rest of Asia to sustain program initiatives.

Sharing Solutions for Greater Regional Impact

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SUCCESS STORIES

A Community Approach to Restoring the Tha Chin River

The Tha Chin is one of Thailand's most important rivers and a source of drinking water. Runoff from industrial production, agriculture, and communities has made it one of the country's most polluted waterways. US-AEP helped form a river clean-up partnership to increase community involvement in restoration efforts. The partners, including the Thai Pollution Control Department, four provinces along the Tha Chin, the Laguna Lake Development Authority in the Philippines, the University of Maryland, U.S. environmental NGOs working to protect the Chesapeake Bay, and U.S. government agencies, shared regional best practices in community watershed protection. Following workshops in Thailand and exchanges to the Chesapeake Bay and Laguna Lake, the Thai government stepped up efforts to restore the Tha Chin through increased integration of the agencies involved. The Ministry of Natural Resources and Environment is using the success of this project as a model to promote environmental stewardship for 15 other river basins throughout Thailand.

"Community participation in environmental management is not just a trend - it leads to sustainable development."

Suwan Nunthasarut
Region #5 Envrionment Director
Thai Ministry of Natural Resources and Environment

United States-Asia Environmental Partnership
THAILAND

Environmental Challenges in Thailand

While Thailand's recent economic recovery brings greater prosperity, the negative environmental impacts of development, rapid urbanization, and industrialization have taken their toll on the country at significant cost to the Thai people. Urban air pollution causes as many as 2,300 premature deaths per year, and air quality continues to worsen with 1,000 vehicles added to the roads each day. Fifty percent of river systems and lakes are classified as poor quality, including major sources of drinking water for millions of Thais. With a new constitution that mandates improved environmental governance, Thailand is attempting to decentralize the process for environmental decision-making and increase pubic participation. US-AEP is working with government, NGO, and private sector partners in Thailand to find viable and sustainable solutions to these challenges.

Cleaning the Air

Particulate emissions from diesel engines pose significant health threats to Bangkok's citizens. With support from US-AEP and the World Bank, Thailand's Pollution Control Department and the Department of Land Transport are devising policy and technology options to reduce harmful emissions from diesel vehicles in Bangkok.

Supporting Clean Water Initiatives

US-AEP is promoting community-based solutions to revitalize the Tha Chin River basin, one of Thailand's largest watersheds and major source of drinking water. The program has engaged a partnership between the Laguna Lake Development Authority in the Philippines, the University of Maryland, U.S. environmental NGOs, and Thai counterparts to develop models for local action.

Strengthening Environmental Governance

- Preventing and resolving environmental disputes through training in mediation with experts from the U.S. Environmental Protection Agency and establishing of a mediation center of excellence.
- Supporting initiatives to train judges for the newly established "green bench" at the Thai Supreme Court, and strengthening court policies and practices to hear environmental cases.
- Developing new environmental enforcement policies and procedures.
- Supporting a CityLinks partnership for sharing environmental management expertise between the cities of Chiang Mai, Khon Kaen, Phuket, and Portland, Oregon.
- Working to establish Thailand's first regulations for public participation in government environmental decision-making.

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CLEANER & HEALTHIER CITIES IN ASIA

US-AEP VIETNAM

Facilitating Cooperation to Solve Environmental Problems

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SUCCESS STORIES

Ho Chi Minh City - Portland Watershed Partnership

"Through our partnership with Portland State University and US-AEP, we have introduced new methods for community participation in cleaning up the canals in Ho Chi Minh City. We value Portland communities, businesses, and citizens as true partners in helping us achieve our mission to create a cleaner city."

Dr. Lam Minh Triet
Director of the Institute for Environment and Resources
Vietnam National University, HCMC

Rapid urban and industrial growth in Ho Chi Minh City (HCMC) is polluting many of the city's canals and waterways. To address this challenge, US-AEP launched an innovative community-based watershed restoration process, a pilot initiative that empowers local governments and communities to work together to devise and implement pollution reduction strategies. Through a US-AEP sponsored partnership between the Vietnam National University in HCMC with Portland State University, a worldwide leader in community involvement in watershed management, city and community leaders are implementing an action plan for the Tan Hoa - Loa Gom Canal aimed at reducing solid waste, promoting adoption of low-cost waste water reduction strategies, and adopting new governance systems that promote replication of community-based methods throughout the watershed.

United States-Asia Environmental Partnership
VIETNAM

Environmental Challenges in Vietnam

Vietnam's explosive economic growth has reduced poverty and improved the quality of life for millions. However, this unprecedented urban and industrial development has come at the expense of air and water quality, particularly in densely populated urban centers. Increasingly evident in Vietnam's cities are signs of air pollution, municipal and household wastes in rivers and lakes, and untreated industrial pollution in close proximity to residences, rice paddies, and schools. Moreover, industrial facilities operate within a weak regulatory framework while civil society and local communities have limited power and influence in addressing environmental concerns. US-AEP develops partnerships in Vietnam to face these challenges.

Cleaning the Air

- Promoting the adoption of tighter fuel and vehicle emissions standards.
- Improving air quality monitoring and vehicle inspection/maintenance programs.
- Strengthening capacity of governmental agencies, research institutions and donor organizations to improve air quality management.

Improving Solid and Hazardous Waste Management

- Establishing Resource Cities partnerships between Hue-Honolulu and Hai Phong-Seattle.
- Organizing and empowering low-income waste collectors in Ho Chi Minh City.
- Improving the capacity of government agencies and industry to safely manage toxic and hazardous wastes.

Supporting Clean Water Initiatives

- Introducing community-based environmental management programs along the Tan Hoa Lo Gom Canal in Ho Chi Minh City and sharing lessons with communities in Manila and Portland.
- Improving response readiness to oil spills in the Saigon River estuary.

Promoting Industrial Environmental Management

- Introducing voluntary codes of conduct for the chemical sector.
- Demonstrating an innovative process to recycle athletic shoe leather waste.
- Promoting proper management and disposal of toxic chemicals in the power sector.

Strengthening Environmental Governance

- Facilitating the establishment of the Vietnam Environmental Protection Fund.
- Piloting "polluter pays" principles in wastewater management in Hanoi.
- Strengthening the legal framework for non-public sector involvement in solid waste management in Ho Chi Minh City.
- Funding a small grants program to enhance civil society and public participation in environmental decision-making.

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SOLID WASTE BENCHMARKING STUDY OF 13 THAI MUNICIPALITIES

January 2004

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Executive Summary

Benchmarking of municipal services such as solid waste management (SWM) is a common practice throughout the world. It involves measuring performance and level of service through standardized and comparable numerical indicators. Against these indicators, a local government unit (LGU) can use the collected information to compare their performance in managing solid waste against the performance of other LGUs – in their region, in their country, or worldwide – and, in the process, they can better determine potential performance improvements. Additionally, if benchmarking is adopted long-term as a means of performance measurement, a LGU can change the way business is run and can promote a culture of continuous improvement.

Thailand Municipal Benchmarking Study:

From December 2002 to April 2003, a Thai university consortium led by Khon Kaen University undertook a benchmarking survey of the current solid waste management practices of thirteen municipalities in Thailand. This study was funded through a grant from the US-Asia Environmental Partnership (US-AEP) through their Technical Support Services Contract (TSSC). The results were used to provide input into the World Bank's Thailand Environmental Monitor 2003 and to provide tangible data for those working towards the improvement of solid waste management in Thailand.

The survey team was comprised of well-known environmental specialists from four leading universities in different regions of Thailand: Chiang Mai University, Khon Kaen University, Chulalongkorn University, and Prince of Songkla University. The survey team implemented three main activities: (1) designed the survey methods & questionnaires, (2) conducted the survey in three or four municipalities in their region, and (3) compiled the survey data. The team from Khon Kaen, along with assistance from the TSSC Office in Thailand, then took responsibility for writing the benchmarking report.

Participating Cities:

The thirteen cities that participated in this solid waste management survey (see Table 1 on page 3 and map on page 4) offer a good sample of small and medium-size cities in each region of Thailand. They range in size from 39,065 people (Kanchanaburi) to 270,609 people (Nonthaburi). Further, these cities are experiencing a diversity of problems and challenges in managing their solid waste and are trying various methods, some quite creative, to overcome them.

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Table 1: Participating Cities

City	Registered Population (2001)	Land Area (km^2)	Sub-Districts	Solid Waste Management	
				Collection	Disposal **
Northern Region					
Chiang Mai	173,856	40	14	75% privatized ‡	Private engineered landfill
Phitsanulok	87,976	18	1	Municipal-operated	Municipal engineered landfill
Lampang	69,334	22	8	Fully-privatized	Private engineered landfill
Northeastern Region					
Khon Kaen	179,153	46	1	Municipal-operated	Municipal engineered landfill
Nakorn Rachasima	174,322	38	24	Municipal-operated	Open dump (army site)
Ubon Rachathani	105,150	29	4	Municipal-operated	Open dump (army site)
Central Region					
Rayong	55,942	17	4	Municipal-operated	Municipal sanitary landfill
Kanchanaburi	39,065 *	9	5	Municipal-operated	Municipal open dump
Nonthaburi	270,609	39	5	Municipal-operated	Provincial open dump
Pattaya	85,533 †*	53	4	70% privatized ‡	Municipal engineered landfill
Southern Region					
Hatyai	157,806 †	21	--	Municipal-operated	Municipal controlled dump
Surat Thani	114,840 *	69	6	Municipal-operated	Municipal open dump
Phuket	72,754	12	17	50% privatized ‡	Private incinerator; Provincial engineered landfill

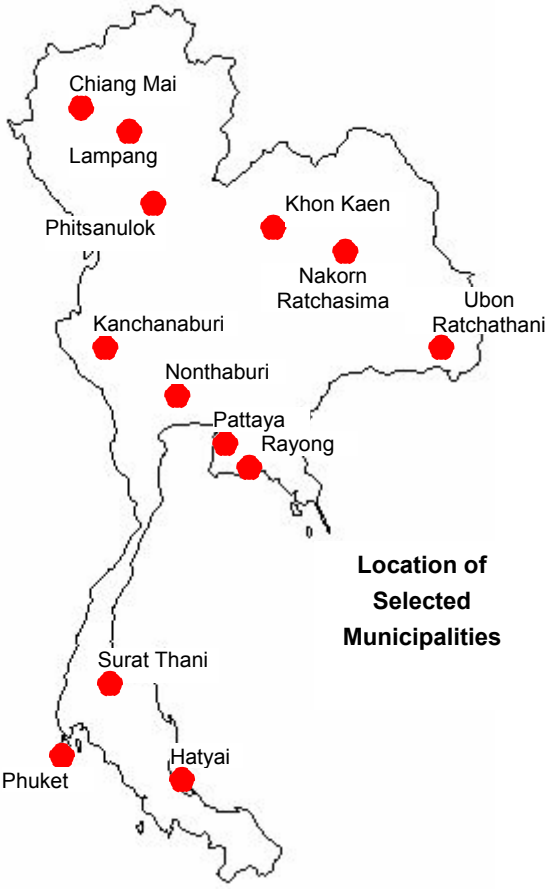
* 2002 population
† Pattaya and Hatyai have a high unregistered population, estimated to be 500,000 and 150,000 respectively. Most of these people work in the tourist industry.
‡ Measured by the percent of the municipal area served by private collection.
** The definitions of "open dump", "controlled dump", "engineered landfill", and "sanitary landfill" are provided by the World Bank and are detailed on page 10.

Common Problems in Managing Solid Waste:

In addition to collecting hard data on the solid waste management practices of the 13 municipalities, the survey team asked local officials about the problems they face in managing their solid waste. The most common that were reported are discussed below. To highlight that some municipalities are effectively facing their solid waste management challenges, some success stories are also presented in text boxes.

1) Unfavorable private sector contracts: As shown in the table above, some municipalities have privatized some or all of their disposal and/or their collection services. This can be a positive development. In some cases, the private sector can offer services more effectively and efficiently than the public sector. However, many of the municipalities in this survey reported problems with their private contractors, some of which are of their own making. For instance, while Phuket is one of the only municipalities (if not the only one) in Thailand that charges the community for both solid waste collection and disposal fees, the city negotiated a set deal with the fee collection company whereby only 1.4 million baht/year is returned to the municipality. Meanwhile, in Pattaya, officials reported that the

solid waste collection company was only serving 70% of its contracted area due to problems in the company's collection efficiency. One municipality – Phitsanulok – finally decided, after experiencing problems with its private company, to take back management responsibilities. Officials report that they now experience fewer problems.



Location of Selected Municipalities

2) Inefficient fee collection: A few municipalities reported that one of their major problems is their low rates of fee collection. The data collected from the municipalities also suggest that this is a major problem. The data on operating costs to operating revenue (summary on page 19) implies that all the surveyed municipalities operate well under deficit status and that municipalities that have privatized some or all of their services are worse off in this regard.

Rayong

Rayong Municipality implements a number of successful initiatives, including a solid waste bank, organic waste separation, a program that allows resident to trade waste for eggs, and hazardous waste separation. All hazardous waste is separated at home and picked up separately before sent to the hazardous waste disposal company.

Phitsanulok

Phitsanulok is well known for its success-ful recycling program. According to the Pollution Control Department, the Municipality processes over 3,600 tons of recyclables a year. Part of their success is attributed to source separation at the household level. Due to the Mayor's vision and concern about the environment, this Municipality has many successful waste management pro-grams, including recycling, separation of organic waste and separation of hazardous waste.

3) Difficulty in waste collection: Chiang Mai and Phitsanulok reported problems in the condition of their collection trucks. In Chiang Mai, the survey found that only 85 % of trucks are in operating condition, which then led to collection problems. In addition, a number of municipalities reported that their trucks have difficulty collecting from all households due to narrow and disorganized roads.

4) Not-in-my-backyard (NIMBY) syndrome: Most of the municipalities that do not currently dispose of their waste in a sanitary or engineered landfill – Hat Yai, Khon Kaen, Nakhon Rachasima, Ubon Rachathani, Kanchanaburi, Surat Thani – reported having problems either building or operating new landfills due to resistance from the public (see page 10).

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5) Inadequate condition of disposal sites: A number of municipalities reported problems with the condition of their landfills or transfer stations. Common problems reported include insufficient leachate collection, treatment systems and groundwater monitoring. In Phitsanulok, for instance, officials reported that the size of their leachate collection and treatment lagoon is insufficient. Far worse, the site in Kanchanaburi has no leachate drainage or treatment system and no groundwater monitoring. In addition, a few municipalities reported that there is no separation of hazardous waste from their solid waste; thus, in these municipalities, there is a risk that hazardous waste can contaminate the landfill area and water resources in the vicinity.

Nonthaburi

Unlike many municipalities that have either privatized their solid waste disposal or continue to handle it themselves, Nonthaburi disposes of its solid waste in the Provincial Administration's open dumpsite at a low service charge of 27.10 baht per ton. The Municipality claims that this is less of a problem and is more cost effective than operating its own disposal site.

6) Scavengers: Six cities – Rayong, Phuket, Pattaya, Hat Yai, Surat Thani, and Kanchanaburi – reported the presence of scavengers, whose health is seriously endangered by exposure to unsanitary conditions. The fences around the facilities in these municipalities do not seem to be much of a deterrent. Hat Yai reported the largest number of scavengers, despite the fact their landfill has a fence around it. Chiang Mai and Lampang reported that they have no scavengers and that fences were a factor in this.

Summary of Survey Data from 13 Thai Municipalities

This section provides a summary of the data and information that was collected from local officials in the thirteen municipalities that participated in this solid waste benchmarking study. Most of the section provides a comparison of the municipalities against select indicators. The full data sets can be found in Annexes E and F.

The section is divided into two parts. The first part focuses on municipal management of solid waste, including solid waste collection, solid waste disposal, recycling, and municipal staffing in solid waste management. The second part covers municipal spending and funding for solid waste management and covers overall spending, operation and maintenance expenditures, capital expenditures, and fee collection. In addition to collecting hard data, the survey team asked local officials about the problems they face in managing their solid waste. This information is presented along with the data in this section.

As is also stated in Annex B (Methodology and Data Limitations), the survey team found that most municipalities lack accurate data in many areas and especially for their annual expenditures for operation and maintenance and for capital equipment. In many cases, local officials were unable to provide data for certain indicators, which complicated making detailed comparisons between municipalities. However, an analysis of the data did allow the survey team to draw some general comparisons and to make a number of useful observations about current trends in municipal solid waste management.

One of the comparisons made throughout this report is between municipalities that have privatized some or all of their solid waste management services and those that rely on their own municipal-run services. For ease of comparison, information on the former group of municipalities – Lampang, Chiang Mai, Phuket, and Pattaya – is presented at the front of the many bar charts presented in this section. It is worth noting that only municipal data is presented for these four municipalities. Data from their private companies was not collected, largely because of resistance by the private sector to share information.

Part 1: Summary of Collection, Disposal, Recycling and Staffing

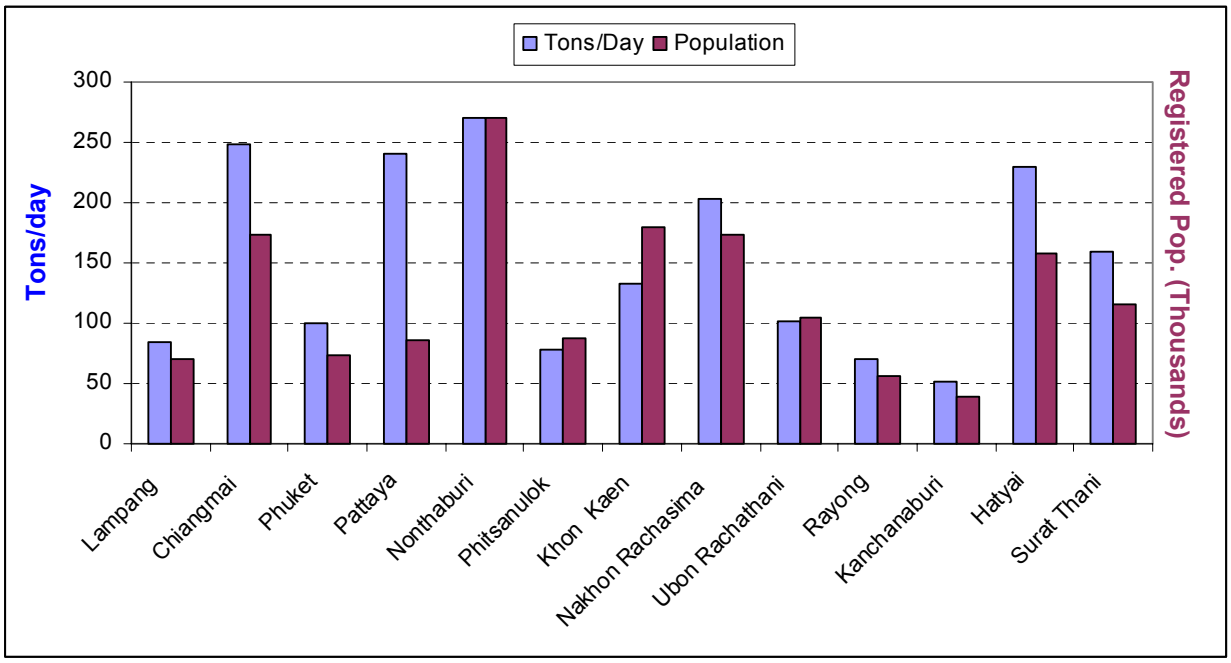
A. Solid Waste Collection

In nine of the thirteen municipalities surveyed, the collection of solid waste is undertaken by the municipality itself. As measured by the percent of the municipal area served by private collection, Lampang's collection services are fully privatized, while Chiang Mai (75%), Pattaya (70%), and Phuket (50%) are partially privatized.

Tons of Solid Waste Collected. Most municipalities do not have reliable estimates for the amount of solid waste that is produced within their localities, so this survey focused instead on the amount of solid waste that is collected. In the thirteen surveyed municipalities, the reported amounts varied from 51 tons/day in Kanchanaburi to 270 tons/day in Nonthaburi in 2001 (see Figure 1). In most cases, municipalities arrive at these estimates by weighing their collection vehicles.

As is apparent from Figure 1, the amount of solid waste collected is closely correlated with a municipality's registered population. The average ratio is about 1.3 tons per 1,000 people per day (or 1.3 kilograms per person per day). The ratio for Pattaya, at 2.8 kilograms per person per day, is over double this average. This may be due to the fact that the municipality has a high unregistered population (associated with their tourist industry) that is not accounted for in the ratio. Another explanation is that Pattaya's tourist-based economy generates more waste per capita than other municipalities.

Figure 1: Collection of Solid Waste and Registered Population (2001)



Another exception is Chiang Mai. City officials reported the second highest amount of solid waste collected annually, but, unlike Nonthaburi (which ranked highest), solid waste generation seems to be outpacing the city's population. The rapid growth of Chiang Mai, with its dense population and

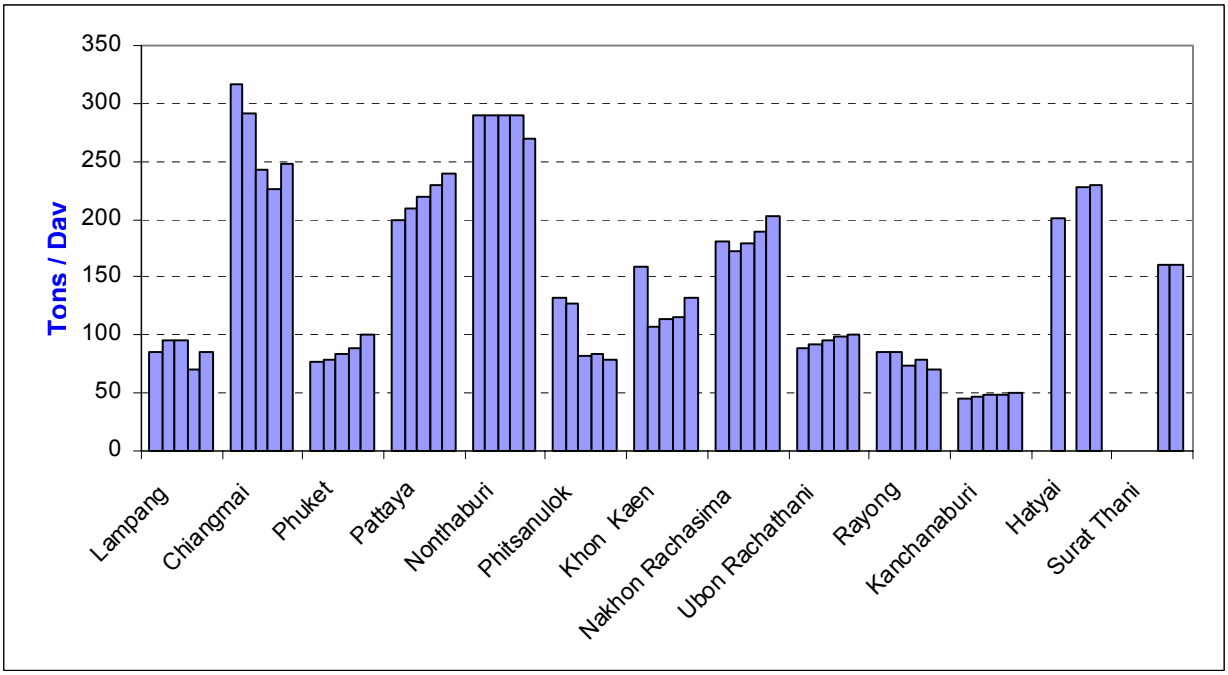
increasing city activities, may offer a reason for this. Industrial enterprises have added to the volume of solid waste in the city and the rising number of visitors, both Thai and foreign, is also a likely factor.

Nevertheless, as shown in Figure 2, the amount of solid waste collected in Chiang Mai in 2001 was lower than was the case in 1998, a trend shared with five other municipalities that were surveyed. Over the five-year period from 1997 to 2001, Phuket (30%) and Pattaya (19%) reported the highest increases.

Collection Efficiency. All thirteen municipalities reported that their collection services extend to 100% of their city districts, while nine of the thirteen municipalities reported collection rates (i.e. the percent of solid waste produced that is collected) in the range of 95% to 100%. These numbers seem to contradict reports by some municipalities that uncollected waste remains a problem in their jurisdictions. For instance, officials in Chiang Mai and Nonthaburi reported that collection was difficult in some areas due to narrow roads (see below), but both reported collection rates at or very near 100%.

Again the main outlier for this indicator was Pattaya. At the time of the survey, officials reported that the company that handles their solid waste collection was only serving 70% of the contract area, and, as a result, the remaining uncollected solid waste was causing an odor problem in the city.

Figure 2: Collection of Solid Waste (1997-2001)



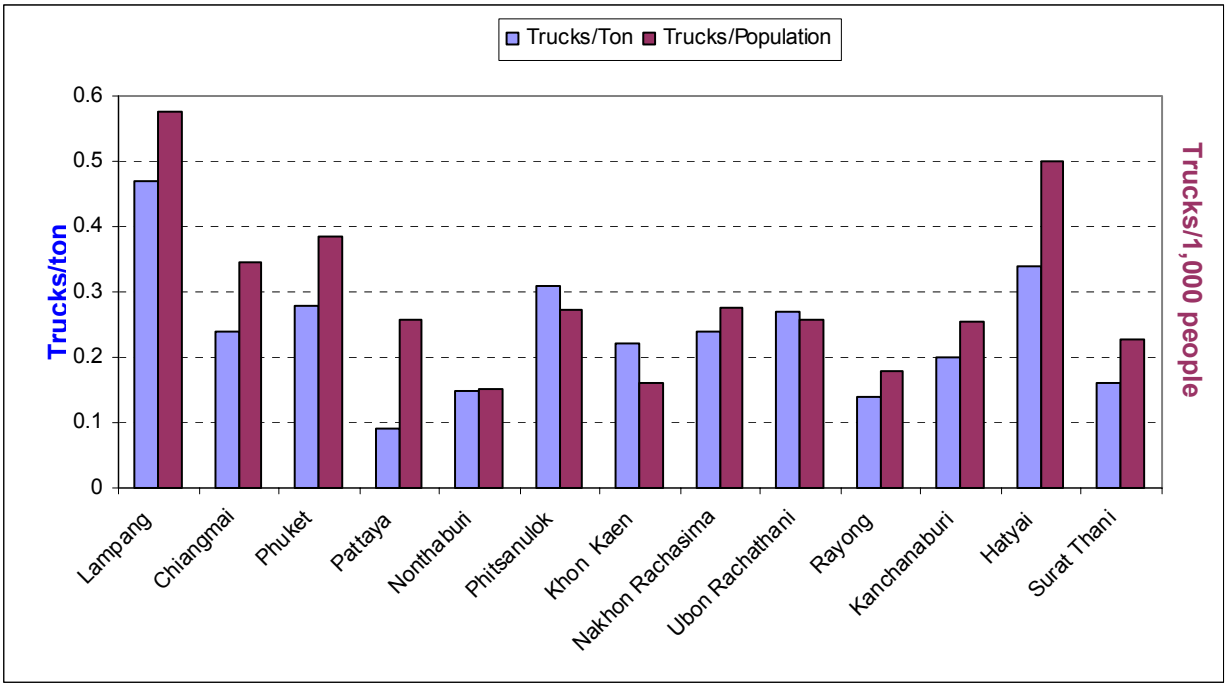
* 1997 and 1999 data unavailable for Hatyai. 1997-1999 data unavailable for Surat Thani.

Collection Trucks. Figure 3 shows the number of collection trucks that are used in each municipality (both in terms of trucks per ton of solid waste collected and per person), which may offer an indicator of a municipality's collection efficiency. However, a more important factor may be how well a municipality utilizes its fleet. For instance, both Chiang Mai and Phitsanulok reported problems in the

condition of their collection trucks. In Chiang Mai, the survey found that only 85 % of trucks are in operating condition, which then led to collection problems.

In addition, a number of municipalities reported that their trucks have difficulty collecting from all households due to narrow and disorganized roads. This problem was reported in Chiang Mai, Ubon Rachathani, and Nonthaburi. Some cities with narrow roads have devised solutions around the problem. In Hatyai, solid waste collection is conducted at night because of the traffic on narrow roads. Meanwhile, the Municipality of Khon Kaen has purchased four-wheel trucks to pick up waste on their narrow roads.

Figure 3: Number of Collection Trucks (per ton of solid waste collected & per 1,000 people)



B. Solid Waste Disposal

Method of Disposal. Twelve of the thirteen municipalities use a landfill or dump as their primary method to dispose of solid waste. Only Phuket incinerates its solid waste, but the city still employs an engineered landfill to serve as secondary disposal for scrap and a reserve in case problems arise with its incinerator.

As shown in Table 2 on page 10, only one of the municipalities – Rayong – uses a site that has all of the operational practices and environmental controls and conditions that qualify it as a sanitary landfill. Meanwhile, six municipalities (almost half of those surveyed) use an open dump or a controlled dump. Surprisingly, five of these six municipalities are among the seven municipalities surveyed that have registered populations over 100,000.

Table 2: Type of Landfill Site Used by Municipalities*

Municipality	Type of disposal site	Definitions (provided by World Bank)
Rayong	Municipal sanitary landfill	Waste accounting, placement, cover and compaction procedures, fencing and adequate staff on site. No waste pickers living on landfill. Regular environmental monitoring. Functional environmental controls including liner, drainage, leachate treatment, and gas ventilation.
Lampang	Private engineered landfill	Some basic waste accounting, placement, cover and compaction procedures, fencing and some staff on site. Waste pickers may be living on landfill. Some environmental monitoring and environmental controls, such as liner, drainage, leachate treatment, and gas ventilation. Controls may be dysfunctional or not operated.
Chiang Mai	Private engineered landfill	
Phuket	Provincial engineered landfill	
Khon Kaen	Municipal engineered landfill	
Pattaya	Municipal engineered landfill	
Phitsanulok	Municipal engineered landfill	
Hatyai	Municipal controlled dump	Unlined pit with soil cover. Some basic waste accounting, placement and compaction procedures. Limited facilities, such as fencing and some staff on site. Limited or no environmental controls. Waste pickers are commonly living on landfill.
Nonthaburi	Provincial open dump	Dumping of solid waste onto the land without soil cover. No formal operational procedures. No environmental controls. Waste pickers are commonly living on site.
Nakhon Rachasima	Open dump (at Army site)	
Ubon Rachathani	Open dump (at Army site)	
Kanchanaburi	Municipal open dump	
Surat Thani	Municipal open dump	

* These designations are not those provided to the survey team by local officials due to the fact that local officials commonly misclassify their site as a "sanitary landfill". These designations were taken from the World Bank.

Five of the six municipalities that use an open or controlled dump reported problems either building or operating new landfills due to resistance from the public. Hatyai, Nakhon Rachasima, and Surat Thani have all proposed new sites but have been unable to build them. Ubon Rachathani and Kanchanaburi have actually constructed new landfills but are unable to use them. As a result, these municipalities are forced to use older and less sanitary facilities, some of which are operating at or beyond their capacity. Nakhon Rachasima and Ubon Rachathani both use open dumps on Army property. In the case of the latter, the Army has asked the Municipality to stop dumping on its property and the Municipality must dispose of its waste at a more distant site at a rate of 130 baht/ton.

In the case of Nonthaburi, the municipality disposes of its solid waste in the Nonthaburi Province Administration's open dumpsite with a low service charge (27.10 baht/ton). The Municipality claims that it is more cost effective to utilize the Nonthaburi Province Administration's open dumpsite than to operate its own disposal site.

Reported Difficulties in Disposing of Waste. A number of municipalities reported problems with the condition of their landfills or transfer stations. As a typical example, officials at Pattaya reported many sanitary problems at their temporary transfer station, including odor, insects, and leachate containment. In Phitsanulok, the size of their leachate collection and treatment lagoon is insufficient.

Perhaps the worst problems were reported in Kanchanaburi, where their site has no leachate drainage or treatment system, and no groundwater monitoring.

Officials in six municipalities – Rayong, Phuket, Pattaya, Hatyai, Surat Thani and Kanchanaburi – reported the presence of scavengers, whose health is seriously endangered by exposure to unsanitary conditions. The fences around the facilities in these municipalities do not seem to be much of a deterrent. Hatyai reported the largest number of scavengers, despite the fact their landfill has a fence. Chiang Mai and Lampang reported that they have no scavengers and that fences helped keep them out of the site.

A few of the municipalities reported that there is no separation of hazardous waste from their solid waste. In these municipalities, there is a risk that hazardous waste can contaminate the landfill area and water resources in the vicinity. This problem was reported in Lampang, Pattaya, Chiang Mai, and Surat Thani. A number of municipalities also reported that the disposal of infectious waste is a problem. While most municipalities have a program to enforce infectious waste disposal from public health services, some public health services still lack proper on site treatment. Thus, some medical waste is still mixed with community solid waste.

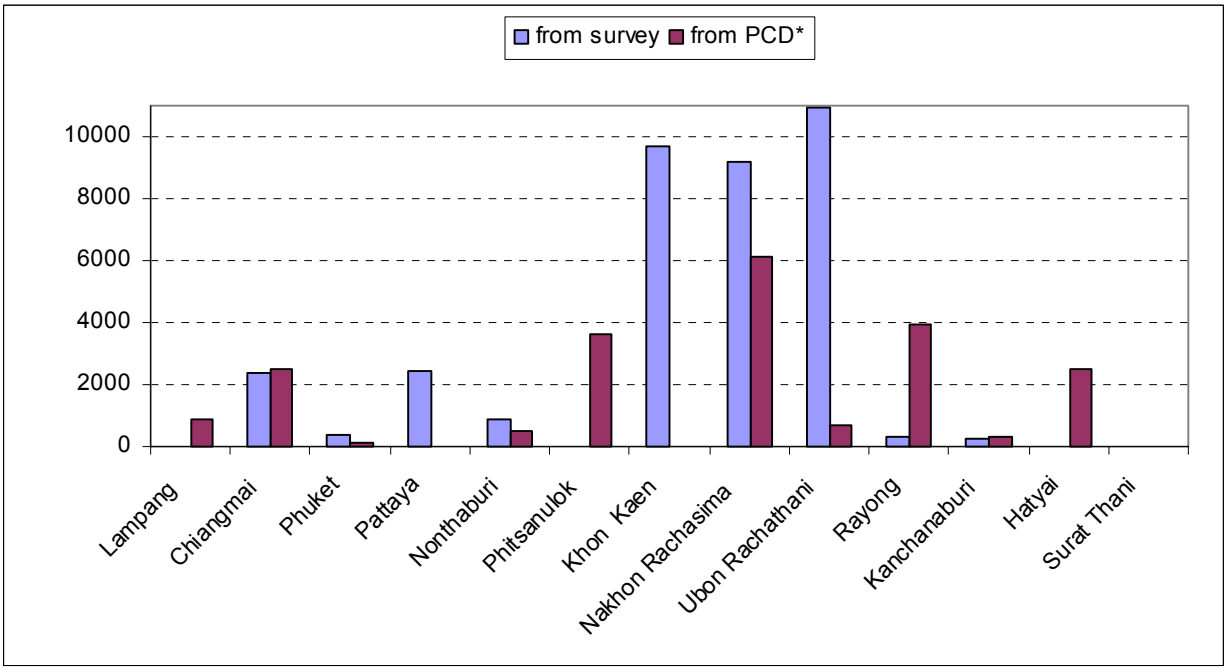
C. Recycling

Many municipalities reported having a program to separate wet (organic) and dry (inorganic) solid waste, but the Pollution Control Department (PCD) reports that many municipal efforts are unsuccessful. The PCD introduced a national program that promoted waste separation a few years ago, but the program was unsuccessful due to collection problems and difficulties in convincing people to separate their waste. A number of cities reported similar problems in convincing their citizens to separate their waste.

However, some municipalities have had some success in promoting recycling. Phitsanulok, for instance, is well known for its recycling program. According to the Pollution Control Department, the Municipality processes over 3,600 tons of recyclables a year. Part of their success is attributed to source separation at the household level. The Municipality has many successful waste management programs, including recycling, separation of organic waste and separation of hazardous waste.

Figure 4 presents the amount of recyclable waste that municipalities reported processing each year, first from this benchmarking study and second from data from the Pollution Control Department (PCD). According to the reported data, the amount of solid waste that municipalities recycle per year is low compared to the overall amount of solid waste they collect. However, it is difficult to draw many conclusions from this data because many municipalities did not report on recycling indicators and the data from those that did is inconsistent.

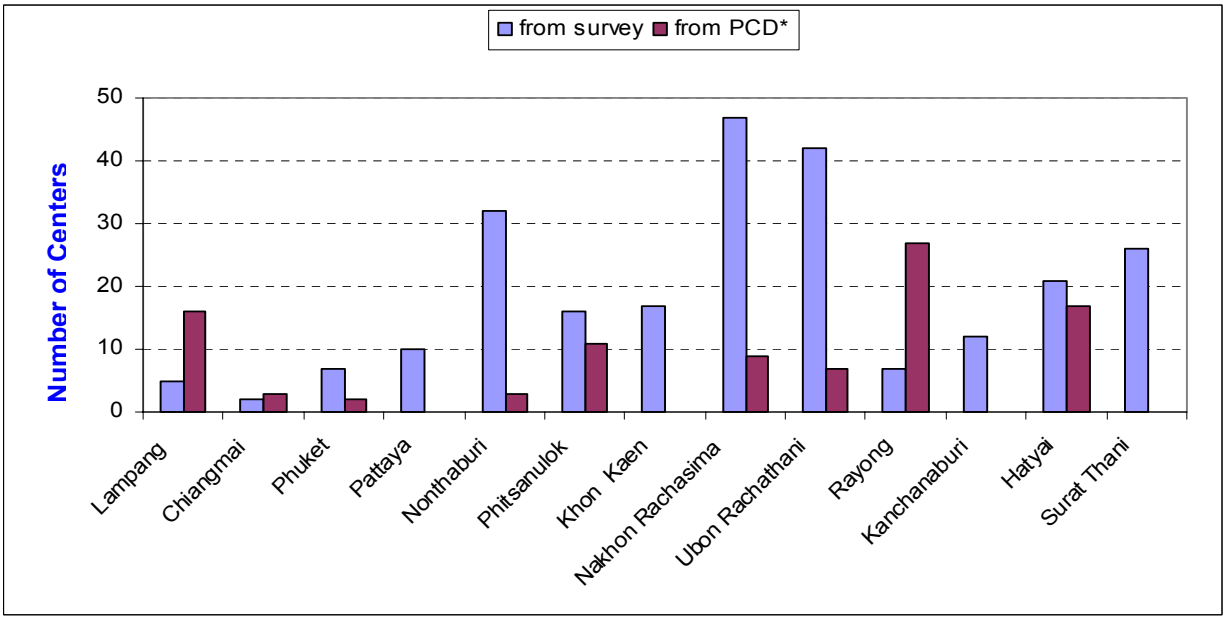
Figure 4: Tons of Recyclables Processed in 2002



* from Pollution Control Department, Thailand, http://www.pcd.go.th

Perhaps a better indicator is the number of recycling exchange centers located in a municipality (Figure 5). This is because most recycling in Thailand is done by the informal sector, which bring recyclables to facilities that exchange recyclables for money. These can include schools, community garbage banks, and private enterprises, such as shops.

Figure 5: Recycling Exchange Centers



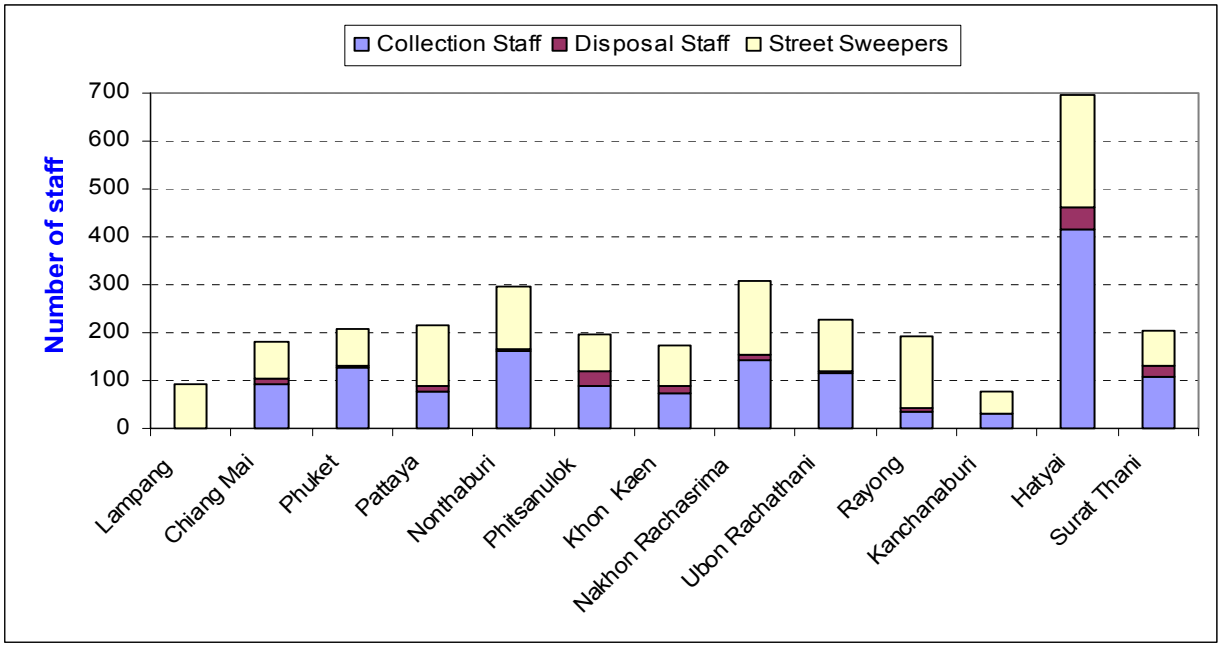
* from Pollution Control Department, Thailand, http://www.pcd.go.th

D. Municipal Staffing for Solid Waste Management

Commonly, municipalities in Thailand divide up the management of solid waste between two municipal departments. Garbage collection and street sweeping is the responsibility of the Public Cleansing Division under the Public Health and Environment Department, while the Public Works Department is responsible for the disposal of solid waste.

Figure 6 shows the number of municipal staff devoted to solid waste collection, solid waste disposal and street sweeping. Because solid waste collection and street sweeping are more labor intensive, these staff are far more numerous than disposal staff in all thirteen municipalities.

Figure 6: Number of Municipal Staff



What is most noticeable about Figure 6 is the large number of municipal staff in Hatyai. They have the most staff in all three categories but have especially large numbers of collection staff. While Hatyai's reported numbers seem high, the municipality also reported owning the most collection trucks and did not have an unusually high ratio of collection staff per collection truck (see Figure 8).

Also worth noting are the numbers for municipalities that have privatized some or all of their municipal solid waste management services. Because Lampang has a private engineered landfill and their collection services are fully privatized, the Municipality reports having no municipal staff for collection or disposal. Those municipalities that have partially privatized collection services – Chiang Mai (75%), Pattaya (70%), and Phuket (50%) – reported some municipal collection staff.

Note on Personnel Data: To reduce complexity and to make it easier to compare municipalities, these numbers do not include administrative or management staff in the different municipalities from the Public Works or Public Health and Environment Departments, most of whom work only part-time on solid waste management. Thus, collection staff includes only drivers of collection trucks and workers on the trucks, while disposal staff include mainly laborers at the disposal or transfer site. The latter category also includes sanitary engineers, mechanics, the Chief of Environmental Management, and the Chief of Sanitary Work.

Municipal Collection Staffing. As shown in Figure 7, the number of municipal staff devoted to collection and transfer of solid waste, as measured by staff per ton of solid waste collected and by staff per 1,000 people, varies from municipality to municipality, but a number of municipalities are not far from the averages of .74 staff/ton and .98 staff/1,000 people. Phuket's staffing level is most surprising given that 50% of their collection area is covered by a private company.

Figure 7: Municipal Collection Staff (per ton of solid waste collected/day & per 1,000 people)

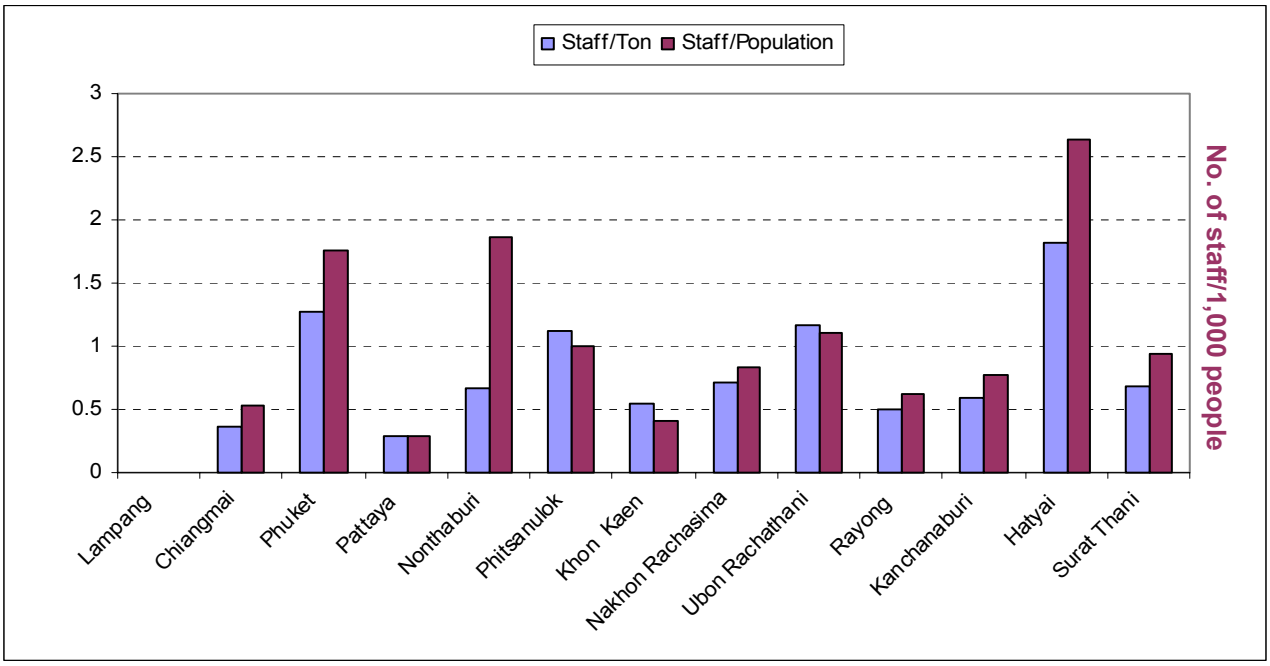
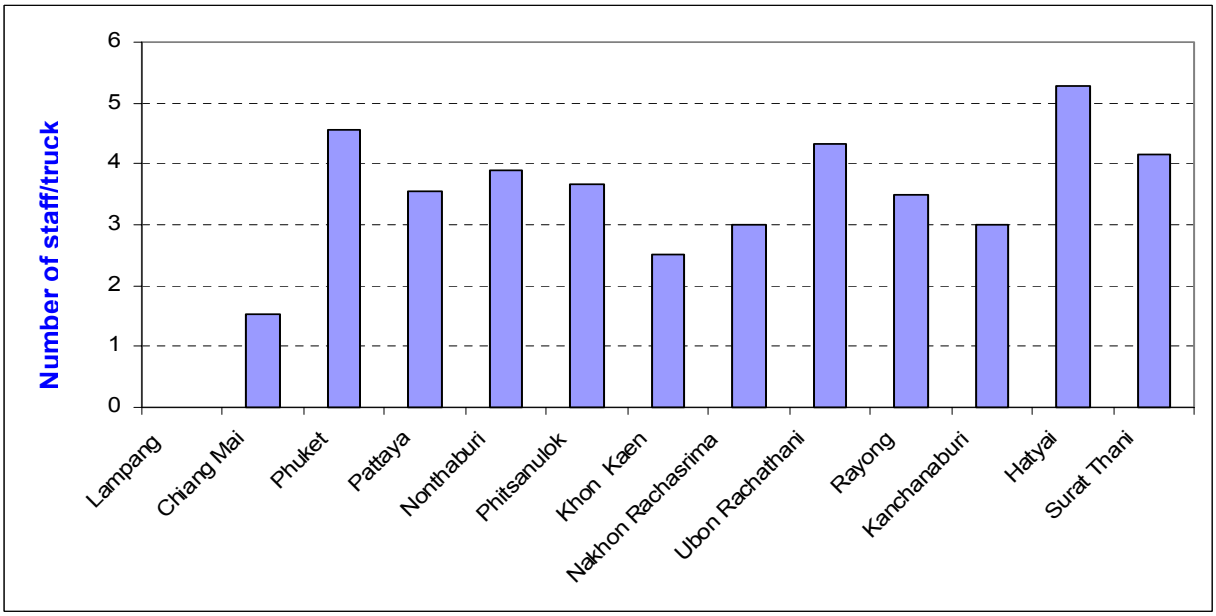


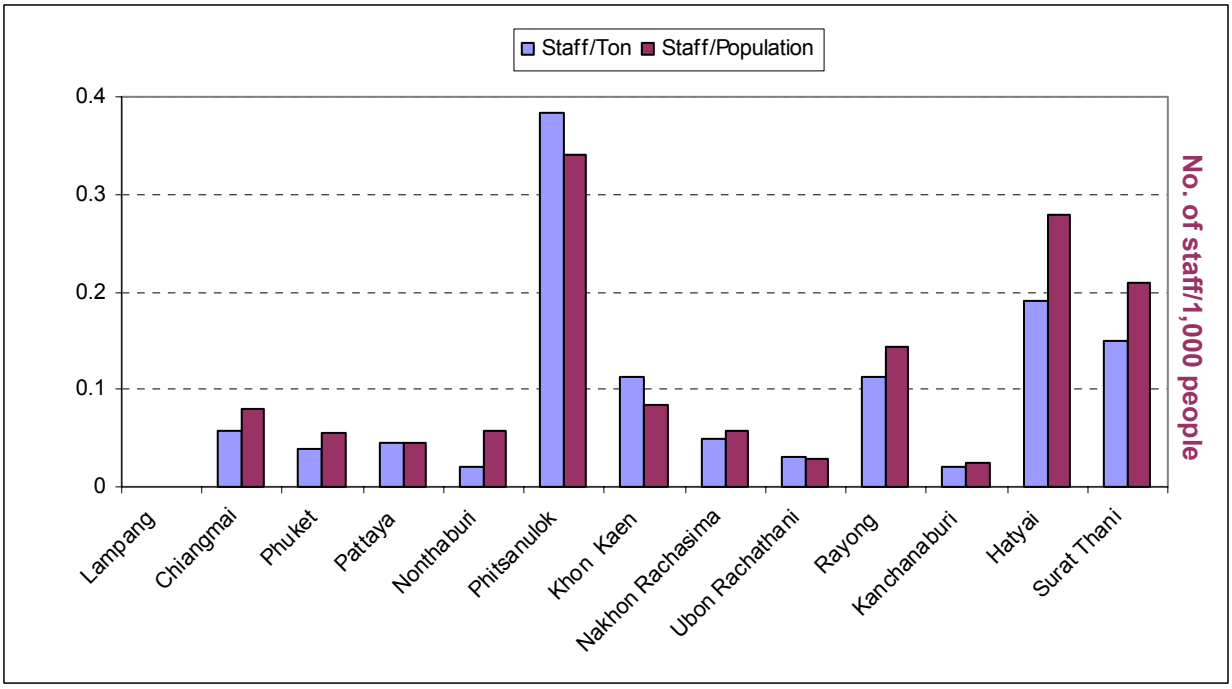
Figure 8: Municipal Collection Staff per Collection Truck



Municipal Disposal Staffing: The second set of staffing indicators measure staff employed for solid waste disposal, measured both by disposal staff per ton of solid waste disposed and disposal staff per 1,000 people (Figure 9). These numbers are more variable than those for municipal collection staffing. While the averages for both indicators are .09 staff/ton and .10 staff/1,000 people, most municipalities fall well below or well above these numbers.

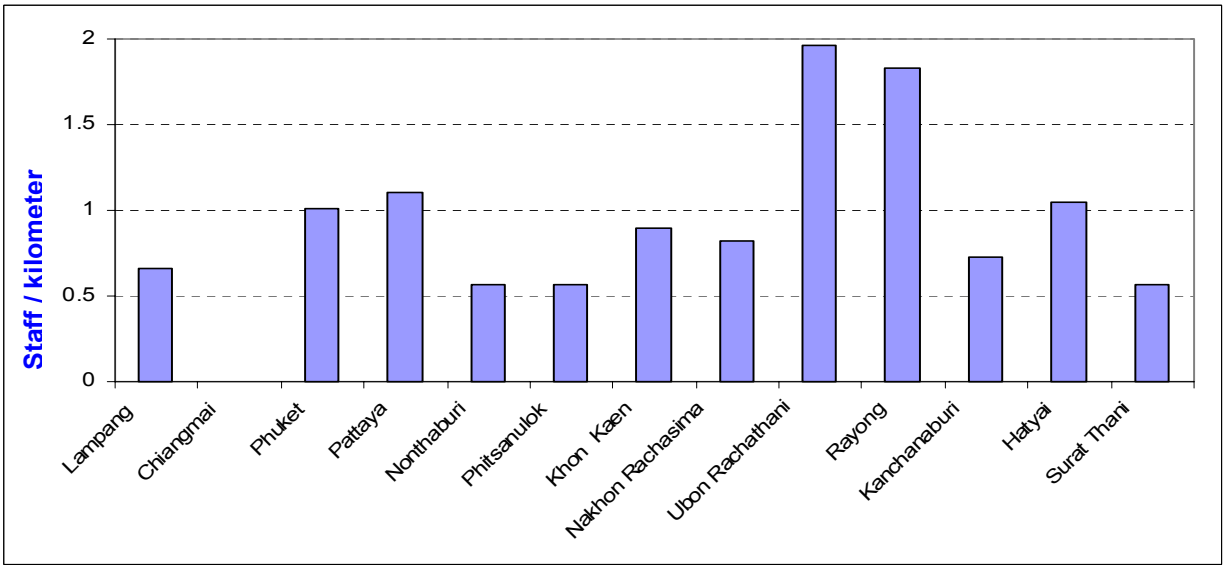
The differences in disposal staff from municipality to municipality may be influenced by many factors, but there seems to be a loose correlation between the number of disposal staff and the type of disposal site. Most of the municipalities that use controlled dumps or open dumps reported having fewer disposal staff. Hatyai and Surat Thani stand out as exceptions.

Figure 9: Municipal Disposal Staff (per ton of solid waste collected/day & per 1,000 people)



Street Sweeping Staff: The last staffing indicator shows street sweeping staff per kilometer of road swept (Figure 10). The average is .98 staff per kilometer. Interestingly, Hatyai comes in just over this average despite having by far the most street sweepers. The Municipality reports that it sweeps 224 km of road, second only to Nonthaburi (233 km). The data for Chiang Mai was not available; however, much of the road cleaning in Chiang Mai is conducted by cleaning vehicles.

Figure 10: Municipal Street Sweeping Staff per Kilometer of Road Swept



Part 2: Summary of Spending and Funding for Municipal Services

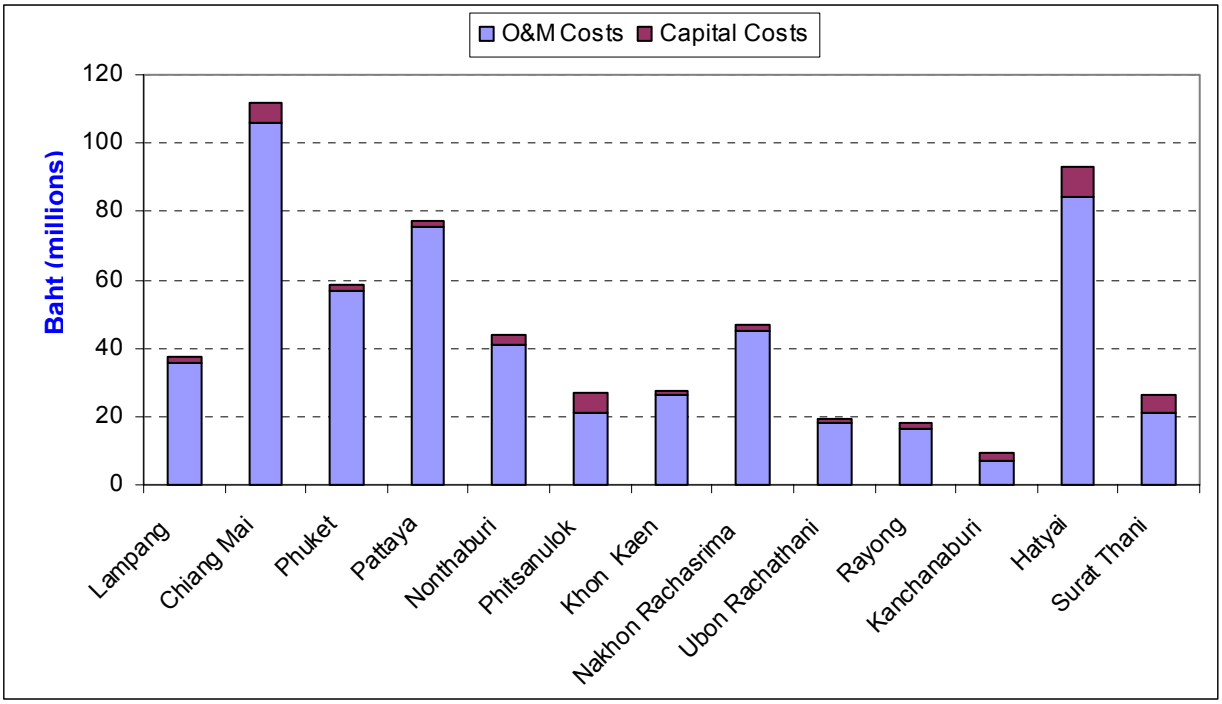
A. Overall Municipal Spending

As shown in Figure 11, municipalities vary significantly on how much they spend on solid waste management from their municipal budgets (i.e. national level spending not included in this graph), and most of this spending is for operation and maintenance. For capital costs, municipalities typically only take responsibility for procuring trucks, containers and other equipment. Large capital costs for facilities such as landfills or transfer stations are usually paid by the Office of Natural Resources and Environmental Policy and Planning (ONEP) or other sources (see page 22 for further information).

Three of the four municipalities that have privatized some or all of their solid waste management services – Chiang Mai, Phuket and Pattaya – spent far more than all but one of the municipalities (Hatyai) that rely on municipal-run services. This is due to the contracts they have with the private sector (included in O&M costs).

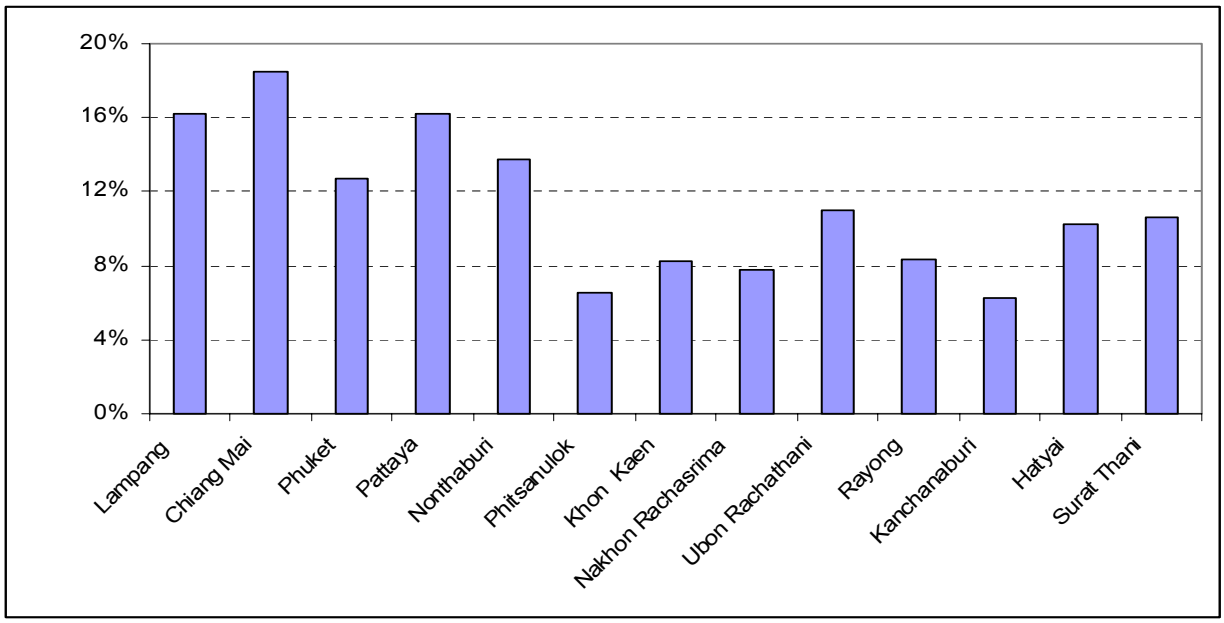
Because of these large contracts with private collection and/or disposal companies, municipalities that have privatized or partly privatized their solid waste services spend a higher percentage of their municipal budgets on solid waste management (see Figure 12) and have higher ratios of costs to revenues than those that manage their services publicly (see Figure 14).

Figure 11: Total Average Annual Municipal Spending for Solid Waste Management Services



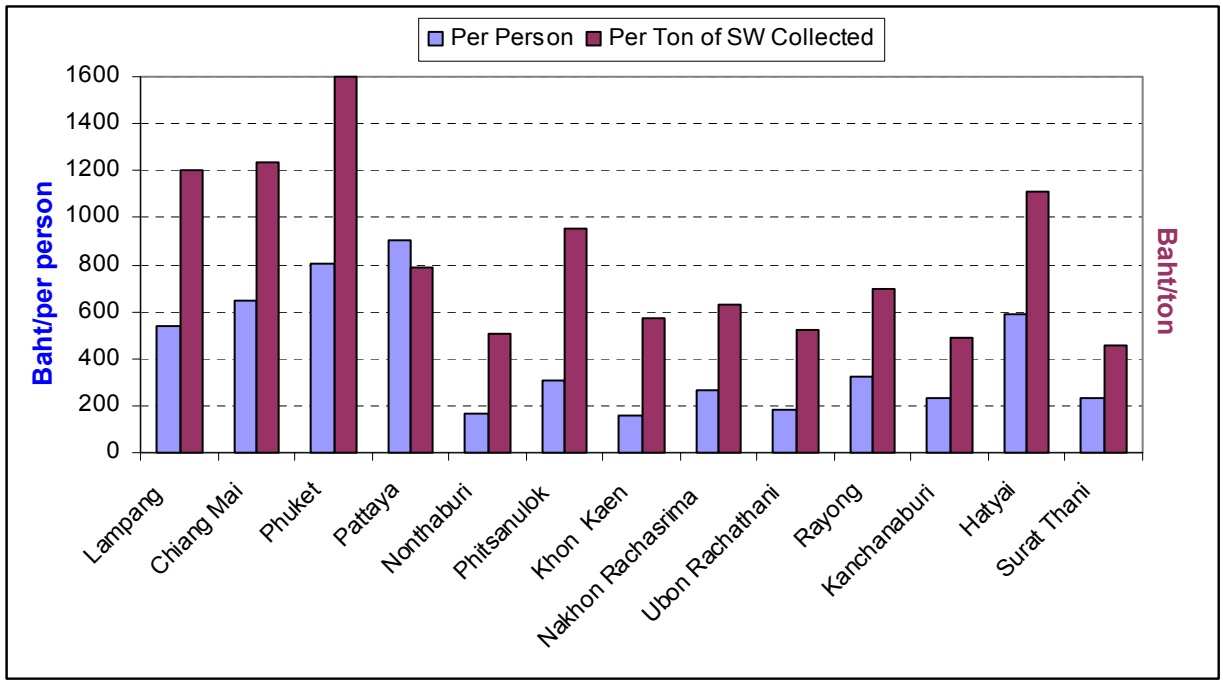
The high cost of private sector contracts seems to account for much of the variability between municipalities in how much they spend on solid waste management as a percentage of their annual municipal budgets (Figure 12). Apart from Nonthaburi, those municipalities that operate publicly spend between 7 to 11 percent of their municipal budgets on expenses related to solid waste management. Meanwhile, the four municipalities that have contracted out with private companies average over 15 percent.

Figure 12: Total Expenditures in SWM (as percent of total annual municipal expenditures in 2001)



In terms of spending per person and per ton of solid waste collected (Figure 13), the difference between the four municipalities and the others is even more pronounced. The exception is Hatyai, which spends a lot of its municipal income on collection and street sweeping staff and also vehicle maintenance.

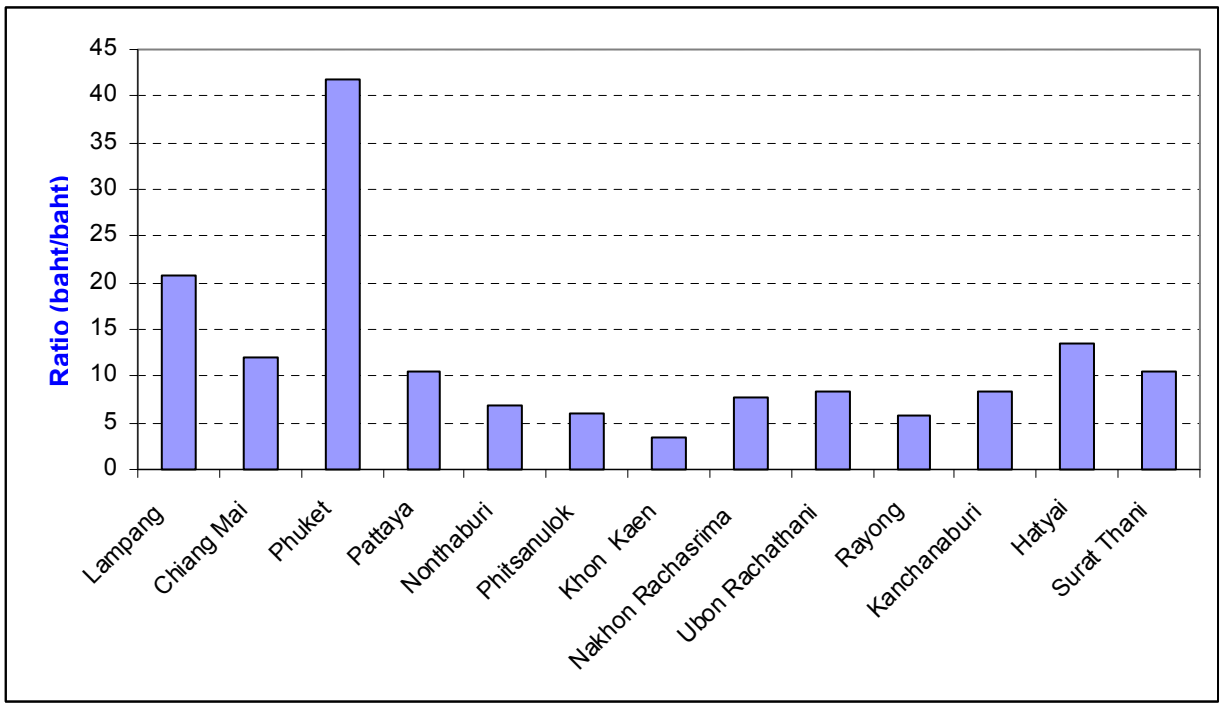
Figure 13: Municipal Spending (per person and per ton of solid waste collected)



In general, municipalities spend far more than they earn on solid waste. As shown in Figure 14, municipal performance in terms of the ratio of average annual spending to average annual fee revenues (mainly dumping fees) indicates that municipalities do not even come close to recouping their solid waste management costs.

Phuket reported that it negotiated a poor deal in privatizing its solid waste fee collection. While it is one of the only municipalities (if not the only one) in Thailand that charges the community for both solid waste collection and disposal fees, it has negotiated a set deal with the fee collection company whereby only 1.4 million baht/year is returned to the Municipality. Meanwhile, the Municipality paid over 50 million baht to the private sector in 2002. This accounts for Phuket's reported ratio of nearly 42:1.

Figure 14: Average Annual Spending on SWM / Average Annual Revenues from Fees

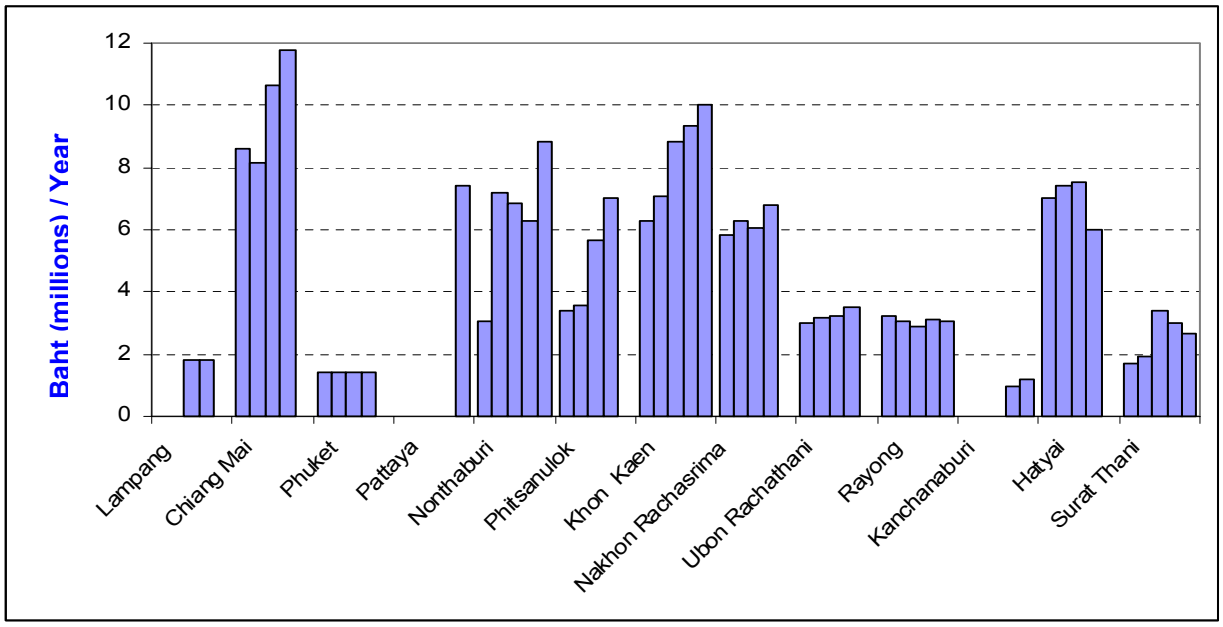


B. Fee Collection

Most municipalities process fee collection themselves, and the total amounts collected tend to be low. Figure 15 shows how much municipalities have collected from fees from 1998 to 2002 (when data was available). In a number of municipalities, the revenue from user fees has been increasing in recent years. This increase is likely due to the improvement in collection services, indicating that the municipalities are at least moving in the right direction.

Still, fee collection is still far too low to accommodate the operating costs for solid waste management. Many municipalities consider solid waste collection and disposal to be a service to the community and therefore are not looking to recover their costs. Thus, municipalities must consider increasing their collection fees and/or improving their collection efficiency if they intend to improve services.
The survey data indicates that municipalities should consider pursuing both strategies to increase their fee revenues. As shown in Annex D, fees for solid waste collection are extremely low, especially for households. This indicates that there is a lot of room to increase fee revenue by raising fee levels. Also, based solely on estimates made by the municipalities as part of this survey, collection from households ranges from fifty to ninety percent, indicating that some municipalities need to improve their collection services from households. Collection from the industry and commercial sectors, however, does not seem to be a problem.

Figure 15: Annual Revenues from User Fees (1998 to 2002)



C. Operation and Maintenance Expenditures

As shown in Figure 16, the majority of municipalities spend more on operation and maintenance for collection services than for disposal services. The more detailed breakdown in Figure 17 offers a clear explanation. Every municipality spends more on salaries for collection staff than for disposal staff (because of the higher number of collection staff) and also reported spending more on repairing and maintaining their collection equipment (mainly vehicles) than they spent on repairing and maintaining disposal equipment.

Based on the nine municipalities that manage their solid waste through public services, a typical municipality spends about 43% of its overall expenditures for solid waste management O&M on staff – 22% for collection and transfer staff, 18% for street sweepers, and only 2.5% for disposal staff. The next highest expenditure is for maintenance and repair of collection vehicles (37%), followed by the maintenance of disposal equipment (15.5%). A smaller amount of money is spent on other expenses related to street sweeping (4%) and for costs associated with environmental inspections (1%).

Figure 16: Average Annual Operation and Maintenance Costs

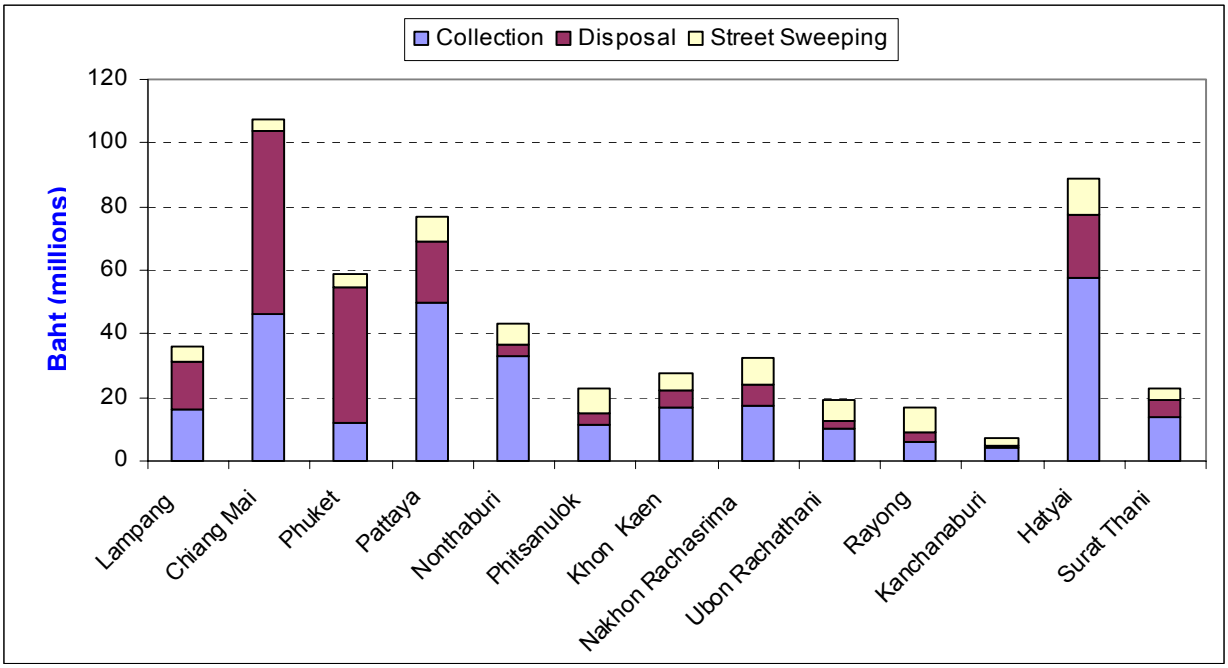
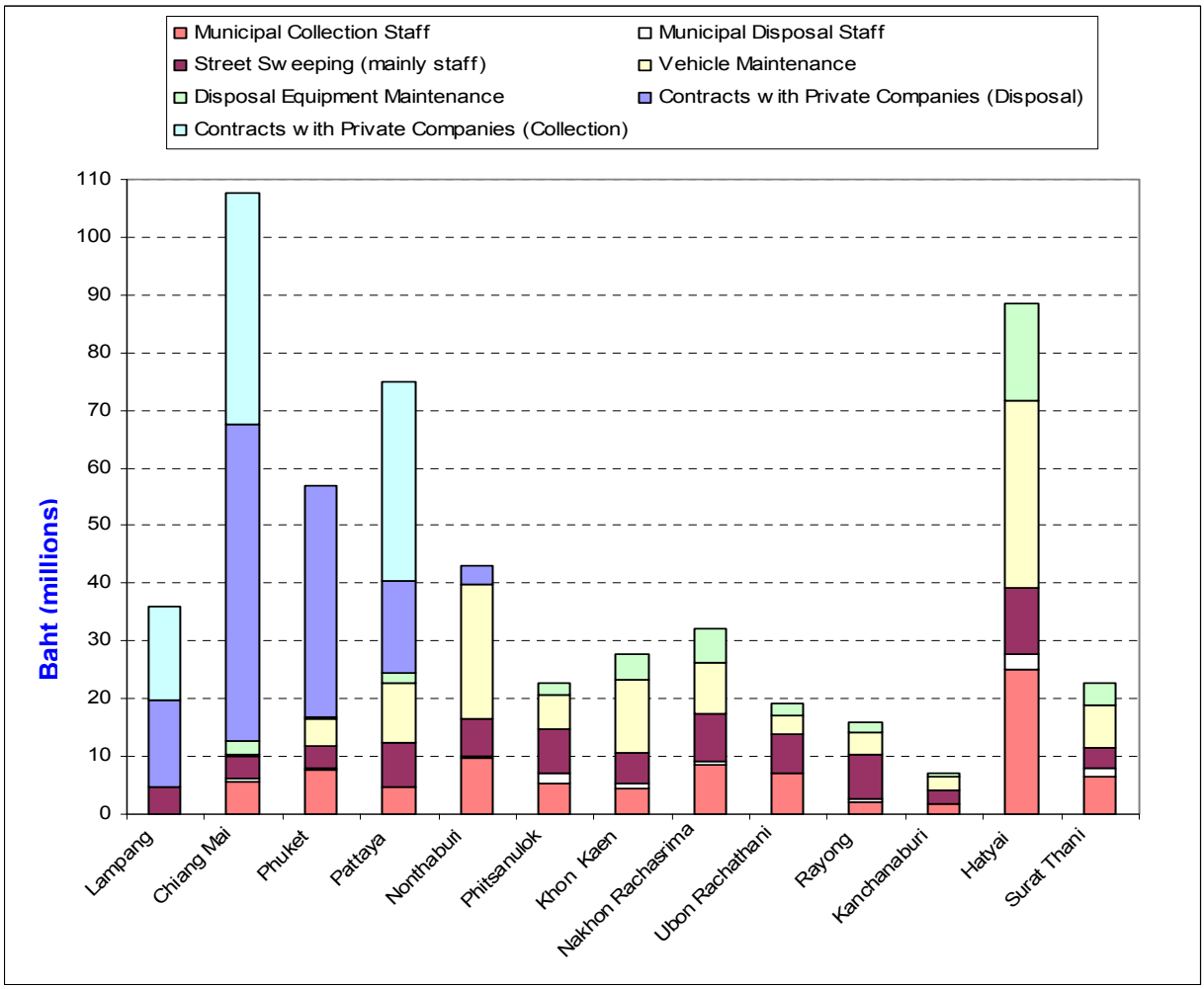


Figure 17: Average Annual Operation and Maintenance Costs (Detailed Version)



Note on O&M data: Municipalities commonly record operation and maintenance data in their annual expenditure report, which follows budgeting guidelines passed down from the central government. Expenditure line items do not match the specific solid waste expenditures requested by the survey team, which complicated data collection. Thus, O&M costs, and specifically vehicle and equipment maintenance, may either be underestimated (if the municipality simply did not report data) or overestimated (if, for instance the municipality attributed all of its "asset maintenance" expenses to solid waste). However, the survey team did its best to gather accurate data. In addition, personnel costs only include workers (e.g. truck drivers, workers at the disposal site, street sweepers). Municipal staff that spend only part of their time on solid waste management, such as municipal engineers, are not included. The calculation for personnel cost equals the number of workers multiplied by the basic wage (5,000 baht/month for collection and disposal staff and 4,100 baht/month for street sweepers.

D. Capital Expenditures

Typically, municipalities procure collection trucks, containers and other small equipment from their municipal budgets, and acquire funds from the central government for larger costs, such as conducting feasibility studies, designing and constructing new disposal sites, upgrading existing sites, purchasing land, constructing transfer stations, and heavy equipment at the site.

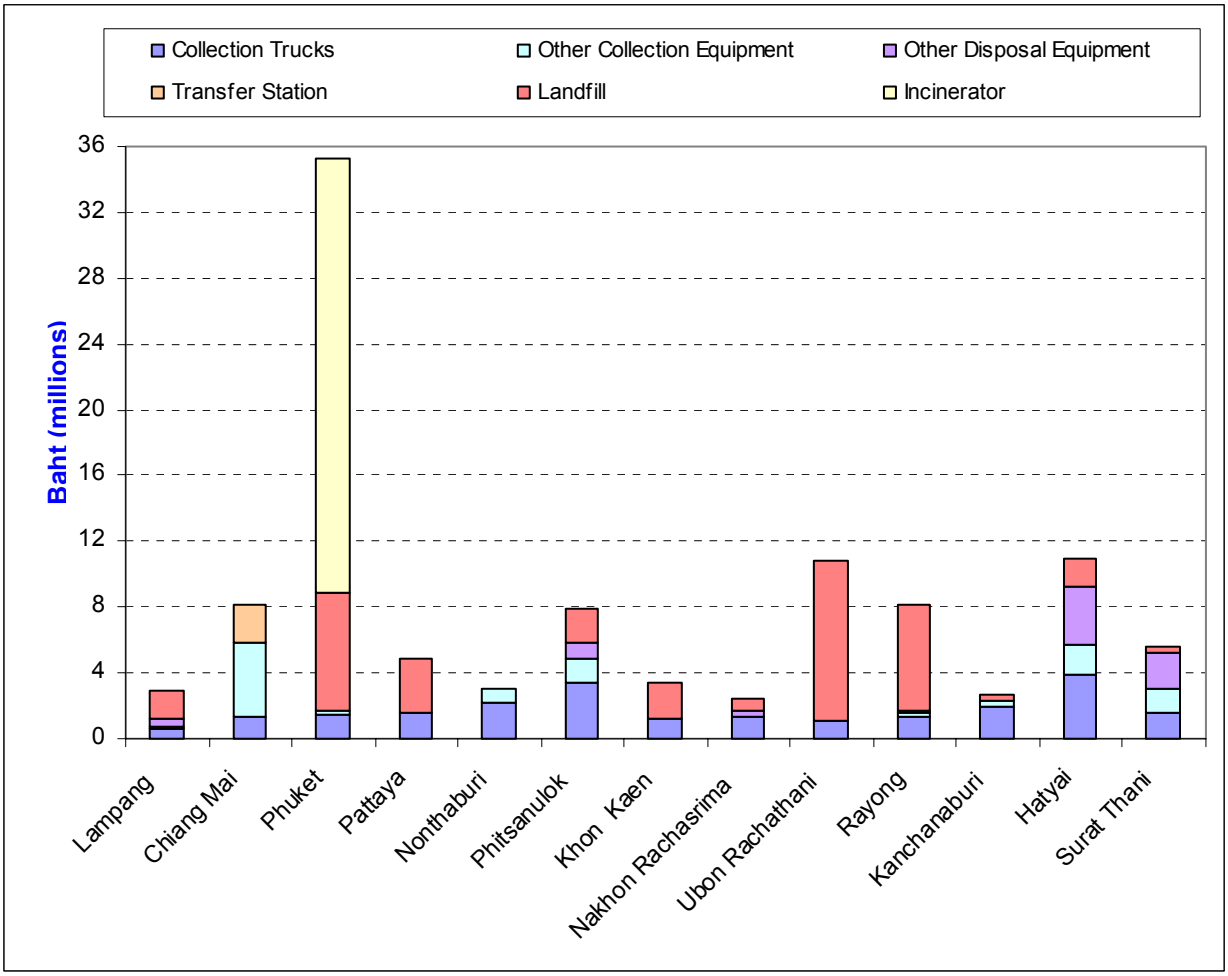
In many cases, these national funds came from the Office of Natural Resources and Environmental Policy and Planning (currently the Office of Environmental Policy and Planning or OEPP). Six of the municipalities surveyed (Chiang Mai, Phuket, Phisanulok, Khon Kaen, Hatyai, and Rayong) received funds from the OEPP's Environmental Fund. The purpose this fund is to facilitate capital development for pollution control systems and equipment in local government units, state enterprises or private companies in Thailand. Established in 1995, the Environment Fund offers a mix of subsidies and soft loans and requires a cost share of at most 30-35 % of the total project budget.

Another source of funding from the national government is the Department of Public Works, although this no longer seems to be a common source. In this survey, only Phuket reported receiving funds from this Department. Also, Surat Thani received a small amount of funding from the Ministry of Science Technology and Environment (MOSTE) for the construction of an emergency dump site.

In addition, two municipalities – Phitsanulok and Khon Kaen – reported that they received funding from a donor organization, the Danish funding agency DANCED. These funds were spent on various projects, such as an infectious incinerator, a composting plant, and a recycling program.

Figure 18 shows capital costs for solid waste management. As is apparent, the range across municipalities varies significantly. Apart from Phuket, which spent almost 800 million baht on a new incinerator in 1998, capital spending ranges between 2.5 and 11 million baht per year. Much of the variation is likely explained by limitations in the data. Many of the municipalities surveyed did not have reliable data for their capital expenditures, and the data that was collected generally covers only the last five to six years. So to some extent, municipalities like Hatyai show higher capital costs because they provided more reliable data.

Figure 18: Average Annual Capital Costs (From All Funding Sources)



Note on Capital Cost data:

Average capital costs were determined using different lifecycles for equipment as follows:

2 years - Garbage Containers and Miscellaneous Equipment (e.g. push-cart, rickshaw, collection boats, etc.)
10 years - Collection trucks, sweeping cars, and disposal equipment (e.g. dump truck, caterpillar tractor, bulldozer, weighing machine)
20 years – Landfill Facilities, Transfer Station
30 years - Incinerators

Annex A: Contacts and References

I. Municipality Addresses

Northern region:

1. Chiang Mai - Chiang Mai Metropolitan Municipality, 1 Wangsingkum Changmoi Sub-District, Amphur Muang, Chiang Mai 50000. Tel: 053-252-178

2. Phitsanulok - Phitsanulok City Hall, 1299 Boromatrilokanart Rd., Nai Muang Sub-District, Amphur Muang, Phitsanulok

3. Lampang - Lampang Metropolitan Municipality, 054 Chat Chai Road, Nai Muang Sub-District, Amphur Muang, Lampang 52000. Tel: 054-219-211

Northeastern region:

4. Khon Kaen - Khon Kaen City Hall, Prachasamosorn Rd., Nai Muang Sub-District, Amphur Muang, Khon Kaen 40000

5. Nakhon Rachasima - Nakhon Rachasima Metropolitan Municipality, Po Klang Road, Amphur Muang, Nakhon Rachasima Province, 30000. Tel: 044-242-959

6. Ubon Rachathani - Ubon Rachathani Metropolitan Municipality, 147 Srinarong Road, Amphur Muang, Ubon Rachathani 34000. Tel: 045-246-060-3 Fax:045-252-232

Central & eastern regions:

7. Nonthaburi - Nonthaburi Metropolitan Municipality, Governmental District, Rathanatibet Rd., Bangkaso Sub-District, Amphur Muang, Nonthaburi 11000. Tel: 02-589-0495, 02-589-0507-8

8. Pattaya - Pattaya City Hall, 171 Mue 6 Nong Pure Sub-District, Amphur Bang La Mung, Chonburi 20000. Tel: 038-429-125

9. Rayong - Rayong Metropolitan Municipality, 121 Taksin Mahasaja Rd., Ta Pra Du Sub-District, Amphur Muang, Rayong. Tel: 038-611-120

10. Kanchanaburi – Lakmueng Road, Ban Nua District, Amphur Muang, Kanchanaburi 71000. Tel: 034-511-502. Fax: 034-514-788

Southern region:

11. Hatyai - Hatyai Metropolitan Municipality, 445 Patchkasem Rd., Hatyai District, Songkla 90110. Tel: 074-244-592 and 074-233-277

12. Surat Thani - Surat Thani Municipality, Pakdee Anusorn Rd., Amphur Muang, Surat Thani 84000. Tel: 077-272-513 and 077-272-583

13. Phuket - Phuket City Hall, 52/1 Narison Rd, Talad Yai, Amphur Muang, Phuket 83000. Tel: 0-7621-2196. Fax: 0-7621-3374

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9. Phuket City
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11. Rayong Metropolitan Municipality
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14. Tourism Authority of Thailand
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15. Ubon Rachathani Metropolitan Municipality
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Annex B: Methodology and Data Limitations

I. Methodology

The methodology of this study incorporated 4 steps: (1) the design of the survey methods & questionnaires; (2) the survey; (3) the compilation, analysis and presentation of the data collected; and (4) the presentation of the results.

(1) The design of the survey methods & questionnaires

Using guidelines on benchmarking indicators from US-AEP and the World Bank, the team designed appropriate questionnaires, in Thai, to ensure accurate and appropriate reporting of data. Based on their experiences in the field, the team also included other relevant questions which it was anticipated would be useful to the study. During this process, the team worked closely with US-AEP and the World Bank and received further guidance from the Environmental Officers from Nonthaburi Municipality.

The pilot project was carried out with the metropolitan municipality of Nonthaburi. The Director of the Environmental and Health Department of the municipality, Ms. Pornsri Kictham, was responsible for reviewing and commenting on the questionnaire. On December 11, 2002, the team members held a meeting with Miss Kictham to discuss the survey activities and to test the methods and questionnaires. These were then revised and a final questionnaire and methods were developed for each of the team leaders to use in their respective regions with the remaining 12 municipalities.

(2) The survey

The remaining 12 municipalities involved in the benchmarking survey were approached by the individual teams. The teams explained the purpose of the study and worked with each municipality to identify the relevant departments and personnel who would be involved in collecting the required data.

A written questionnaire, in Thai, was then sent to the staff members identified. One to two weeks after this, the team leader and assistant visited the municipality to introduce themselves, ensure the objectives of the project were clearly understood and assist in compiling the initial information. The team assistant then conducted field visits to help in collecting the data and worked with the municipal staff to ensure the data was complete.

Throughout this process the individual teams keep in close contact in order the share their experiences and discuss methods.

(3) The compilation, analysis and presentation of the data collected

On February 9, 2003, all the team members and the project coordinator from US-AEP met in Bangkok to discuss how the data would be compiled, in order to ensure that each indicator was reached by using the same calculation. Each team then compiled its data and sent the results to the project manager to analyze. The results were presented in tables and charts, and on a master spreadsheet. In addition to the analysis of each indicator, comparisons between municipalities and relationships between indicators were charted.

(4) Presentation of results

To ensure that all stakeholders in the project would be fully informed of the results of the study, US-AEP, the World Bank and the Pollution Control Department (PCD) organized a workshop with the 13 municipalities involved in data collection and representatives from the PCD and the Ministry of Land Transport. The workshop was held during the National Convention & Grand Exhibition on Solid Waste and Toilet Technology in Bangkok from March 13-16, 2003.

The workshop set out: (a) to present the indicators and other results from the study; (b) to encourage further discussion on the differences in performance and areas for improvement; (c) to share best practices and solutions; and (d) to get feedback from the municipalities.

II. Difficulties in Data Collection

The survey team found that most municipalities lacked accurate solid waste data. In most municipalities, the data is only kept in hard copy for three years. Data that is available is not centralized, which meant the survey teams had to gather data on collection, disposal, procurement, maintenance, fees collection, accounting, etc., from different departments. In some instances, they were unable to collect accurate data.

Additionally, private companies involved in solid waste management in the municipalities concerned were often unwilling to release the information requested. This makes it difficult to compare municipalities that operate publicly with those that have contracted with the private sector for part or all of their solid waste management services.

The survey team also found that few municipalities have accurately measured the amount of solid waste that is diverted from landfills through recycling. Thus, the recycling data from this study is based on estimates gathered from several sources. Data was unavailable for some municipalities, such as Phitsanulok and Surat Thani.

Annex C: Municipal Profiles

This annex provides profiles of the 13 municipalities that participated in the solid waste management benchmarking study. The information was obtained from the field survey, the landfill survey questionnaire and the municipality websites (listed in Annex A). The information presented is more substantive for some municipalities than others depending on the degree of qualitative information obtained from the municipalities.

1. Lampang Metropolitan Municipality

General Profile

Lampang Province is 602 km north of Bangkok and lies at a height of 270 meters above sea level. The Province serves as the central transport junction to the northern provinces. Lampang Metropolitan Municipality sits on the site of a 1,300 year old city, Kala-Nakhon, and many historic structures, such as city walls, canals and temples, are found there.

The Municipality covers a total land area of 22.17 km^2 and is comprised of 8 sub-districts and 32 communities. There are four dense areas in the Municipality – the business center at the southern canal, the commercial center in front of the railway station, the residential center in the old town area, and the ceramic industrial center in Chom Pu sub-district.

The population of Lampang is approximately 70,000 and has remained practically unchanged for the past five years. Much of the population works in small industries such as ceramics.

Solid Waste Management

Among the thirteen municipalities in this survey, Lampang has gone the farthest in privatizing its solid waste management services. The Municipality has a contract with a private company for both solid waste collection and disposal. However, street sweeping and tariff collection are still carried out by the Municipality.

Officials in Lampang identified a number of problems in regard to the management of their solid waste. These include: (1) low public awareness, (2) low enthusiasm of government officials in solid waste management, (3) inappropriate landfill operation, leading to odor and insect problems, (4) high operating costs related to private sector contracts, and (5) no separation of hazardous waste from municipal solid waste.

The Municipality has it own privately-operated engineered landfill site, which has an area of 284 rai and a capacity of 1,460,000 tons. The landfill accepts 85 tons per day and is large enough to accept all of the Municipality's waste. It has a plastic liner and a leachate drainage and treatment system. Groundwater monitoring is performed yearly. No problems have been reported in the management of the landfill – the site is bulldozed and is covered with soil daily. Further, the landfill has a fence around it, and there are no scavengers reported on the site.

Due to the low revenues from fees – 1,800,000 baht in 2001 – and the high yearly fee paid to the contractor – 28,643,375 baht in 2001, or 923.24 baht/ton – the Municipality has one of the highest ratios of operating costs to operating revenues from fees (20:1) of the thirteen municipalities. They also reported spending a high percentage of their municipal budget on solid waste management (16%).

2. Chiang Mai Metropolitan Municipality

General Profile

Chiang Mai is Thailand's second largest city and capital of the northern region. It is approximately 700 km north of Bangkok. Chiang Mai is a major transportation hub for Thailand.

Chaing Mai City was built as a capital for the Meng Rai Dynasty in 1297. The city's history has been developing for over 700 years. Its unique culture makes Chang Mai one of Thailand's most visited locations and a well-known tourist destination.

Chiang Mai Metropolitan Municipality covers 40 km^2 and has 14 sub-districts, comprising the total area of Chang Moi, Hai Ya, Si Pum, Wat Kate, Chang Clan, Pa Tan and Pra Sing and part of Su Tep, Pa Dad, Pha Amm, Nong Pa Kang, Ta Sa La, Nong Hoi and Chang Pak. In recent years, the population of Chiang Mai has grown rapidly. In 2001 the registered population was 173,856. During the tourist high season, this number can be doubled.

Solid Waste Management

The city's growth, both in economic and social terms, has brought many problems, particularly in the amount of solid waste produced by residents and visitors. Industrial enterprises have also added to the volume of solid waste in the city.

Narrow roads within the Municipality are a problem for the collection and transportation of solid waste. In addition, surveys have found that only 85% of trucks are in operating condition, leading to further problems in collection.

The Board of Investment of Thailand has noted that Chiang Mai Metropolitan Municipality has the following solid waste problems:

1. Solid Waste from communities – At present, Chiang Mai Municipality has to deal with the problem of rising quantities of solid waste from the expansion of residential and commercial areas due to the economic and social development of the city.
2. Industrial waste – According to a survey by the Chiang Mai industry office, the majority of industries utilize natural resources in connection with agricultural activities. This leads to a surplus of unused substances and more waste.
3. Infectious waste from public heath services – Mostly this comprises waste from medical sources, including organic waste such as flesh or organs and chemical waste from experiments. Some public health services still lack proper treatment methods and some infectious waste is mixed with the communities' solid waste. There is, therefore, a high risk of disease.

The Metropolitan Municipality disposes of solid waste in an engineered landfill which is operated by the private sector. 2.57% of waste is separated for recycling prior to disposal. The landfill is privately operated using bulldozers and soil from the site to cover solid waste daily. The landfill has an HDPE liner and a leachate drainage and treatment system. Groundwater monitoring is performed 4 times a year. The landfill has a fence around the site to deter scavenging. The site is clean and well operated, but there is no separation of hazardous waste from the municipal solid waste.

The operation and maintenance costs of the Chiang Mai Metropolitan Municipality are in the higher range at 1,185 baht/ton. Similar to Lampang, the city spends a great amount of its income on solid waste management. Among the 13 municipalities studied, Chiang Mai has the greatest MSW expenditure/total expenditure at 18.5%. It also has a relatively high operating cost to operating revenue from fees at 9.42:1 baht.

3. Phuket Metropolitan Municipality

General Profile

Phuket, situated in the Indian Ocean, is Thailand's largest island and the smallest province in the southern region of the country. It is 867 km from Bangkok. Its 39 small islands cover an area of about 543 km^2. Phuket is a major tourist attraction. The surrounding waters contain a wide variety of marine life, and the town is noted for its Sino-Portuguese architecture.

The island is divided into three districts (Thalang in the north, Kathu in the west, and Muang in the south) and 17 sub-districts. The cities of Phuket and Patong have their own city governments, with elected city councils, with the leading member of each council serving as mayor. Phuket Metropolitan Municipality covers an area of 12 km^2. According to the official Registration Record (2001), the resident population of the Muang Municipality was 72,754 persons. During the peak tourist season, this number would be doubled.

Solid Waste Management

Phuket's major industry is tourism and its solid waste generation rate is high (about 1.38 kg per person per day). In the past, all of the islands' waste was disposed of at a 120 rai (0.192 km^2) engineered landfill site. In 1998, the province of Phuket received a grant from the government to expand the landfill by building an additional layer, which would extend its life for a further 7 years. Later, due to land limitation, the island installed two incinerators – a 250-ton incinerator for regular waste and an infectious waste incinerator. The 250-ton incinerator, which the operators claim is operating at capacity, has several ongoing problems, including opposition from the public, a high cost of operation and maintenance, and a high capital cost.

Recently, the City gave the private sector the opportunity to partially subcontract the collection of solid waste and fully subcontract the collection of fees and incinerator operation. Phuket is the only city in Thailand that charges the community for both solid waste collection and disposal fees. After the private company has collected these fees, it returns only 1,400,000 baht/year of the revenue to the city.

About 75% of the total waste collected is disposed of in the incinerator, while 12% of waste is disposed of at the engineered landfill operated by Phuket province. The landfill operates by using soil from the site to cover the solid waste. The landfill has a geotextile and clay liner, as well as a leachate drainage and treatment system. Groundwater monitoring is performed weekly. Even though the landfill has a fence around it, 40 scavengers are present in the site. The site is clean and well operated and attracts a great deal of public interest as it is located next to a sensitive wetland area.

The operation and maintenance cost of Phuket Metropolitan Municipality for solid waste management is 1,592 baht/ton. Among the 13 municipalities, Phuket has the greatest operating cost per operating revenue from fees at nearly 42:1 baht. Although the city spends a large amount of money on solid waste management, expenditure on MSW per total municipal expenditures is relatively low at 12.7 %.

4. Pattaya City

General Profile

Pattaya City is in Chonburi Province, located on the shoreline of the Gulf of Thailand, 147 km southeast of Bangkok. Over the last 50 years, Pattaya has grown from a small village to a major tourist destination. In 1979, Pattaya was designated as a City.

Pattaya City is divided into 4 sub-districts (Nakluea, Nong Prue, Huay Yai, Nong Pralai), including a number of islands, with a land area of 53.44 km^2. Koh Lan (Coral Island), is the largest offshore island and a major tourist destination. The City has its own government with an elected council, the leading member of which serves as mayor. The registered population of the city in 2001 was 85,533. Pattaya City has a high percentage of unregistered persons – as many as 500,000 – mostly working in the tourist industry.

Solid Waste Management

The private company contracted to collect solid waste only serves 70% of the contract area. The remaining uncollected waste causes an odor problem in the city. In addition, there are many sanitary problems found at the transfer station, including odor, insects, scavengers and leachate.

Pattaya City employs the Chat Thai Company to collect solid waste in 90% of the city area and transport it to the city's engineered landfill located in Kao Mai Kaew District. About 100% of the collected solid waste is transported to a transfer station before being transferred to the landfill. As the transfer station is temporary, the quality of the management is quite poor.

Pattaya City has its own engineered landfill site and transfer station. The area of the landfill in use is 50 rai from the total available area of 140 rai. The landfill is of sufficient size to accommodate all the waste from the transfer station (250 ton/day). The landfill is operated using bulldozers and soil from the site to cover the solid waste daily. The landfill has an HDPE liner and a leachate drainage and treatment system. Although the landfill has a fence in place around it, 25 scavengers have been identified. The landfill management is effective; no issues or complaints have been raised. There is currently no hazardous waste separation before disposal; therefore there is a possibility of hazardous waste contamination in areas near the landfill.

Koh Lan sends 4 tons of solid waste a day to its incinerator. However, the incinerator can only dispose of 1 ton/day. The excess waste is sent to the landfill at Maikeaw Island by boat. Occasionally, irresponsible crews have been known to dump solid waste into the sea during transportation.

The annual operation and maintenance costs of Pattaya Metropolitan Municipality for solid waste collection and disposal are 874 baht/ton, which is in the middle range of the 13 municipalities surveyed. The MSW expenditure as a percentage of total municipal expenditure is, at 16.3%, in the highest range.

5. Nonthaburi Metropolitan Municipality

General Profile

Nonthaburi Metropolitan Municipality is in Nonthaburi Province, which is located east of the Chao Phraya River. The town is only 20 km from Bangkok and is accessible by road or river. Nonthaburi Municipality is divided into 5 sub-districts (Suan Yai, Talat Kwan, Tha Saiy, Bang Kean, Bang Krasaw) which cover a total of 38.9 km^2. The population of the Municipality in 2001 was 270,609. Most of the people in this Municipality work in Bangkok.

Solid Waste Management

Nonthaburi Metropolitan Municipality does not own a disposal site. The Municipality disposes of its solid waste in the Nonthaburi Province Administration's open dump at a low service charge of 27.10 baht/ton. The Municipality claims that this is more cost effective than operating its own disposal site.

Only two problems were reported in Nonthaburi: the collection system does not cover the entire area due to the narrowness of some roads; and there is low awareness among the population of solid waste separation and the waste collection schedule.

6. Phitsanulok Municipality

General Profile

Phitsanulok Province is approximately 377 km north of Bangkok and is located at an elevation of approximately 40 m. above sea level. Phitsanulok Municipality covers an area of 18.26 km^2, composed of only 1 sub-district. It is divided into two parts by a river. The east side is a commercial and communication zone, and the west side contains residential, institutional, governmental and military zones. This province is the transit junction to the north and northeast regions of Thailand. The population of the Municipality was reported to be 89,976 persons in 2001.

Solid Waste Management

Phitsanulok Province is well known for its successful recycling program. It has reduced its waste by more than 50% through the efforts of a privately owned recycling company and a campaign sponsored by the Municipality.

After the recyclable waste is separated at home, it is collected and sent to the Municipal engineered landfill. In the past, the Municipality hired a private company to take care of its solid waste and experienced many problems. The Municipality now finds that it has fewer problems collecting and disposing of its solid waste itself. Due to the Mayor's vision and concern for the environment, this Municipality has had many successful waste management programs including recycling, the separation of organic waste and the separation of hazardous waste.

However, collection remains a problem for solid waste management in the Municipality. The trucks used to collect and transfer waste are not in appropriate operating condition (with leakage of wastewater reported). Furthermore, the leachate collection and treatment lagoon found at the disposal site is inadequate in size.

7. Khon Kaen Metropolitan Municipality

General Profile

The Province of Khon Kaen is located in the central area of the northeastern region of Thailand on the Korat plateau, about 100-200 m above sea level. It lies in the geographical heart of Thailand's sprawling northeast plateau, about 445 km from Bangkok.

Most of Khon Kaen Province's land area is agricultural, followed by forested area. Khon Kaen is the third largest province in the region, after Nakhon Ratchasima and Ubon Ratchathani.

Solid Waste Management

The Metropolitan Municipality provides 200 liter garbage containers for household waste. Commercial businesses have to provide their own containers. There are many types of trucks, including 4-wheel pickup trucks, for collection along the narrow roads of the Municipality.

The Metropolitan Municipality landfill site is an engineered landfill in Kham Bon District, which is 17 km from the Municipality. It has been operating for nearly 18 years and is now almost full. The Municipality plans to transfer operations to a new site about 40 km further away. However, the proposed site has raised objections from local people and, as a result, the existing site will be used for another 5 years. Since the landfill has been in operation for so long, there are a large number of scavengers living inside the landfill, including children, elderly adults and stray dogs.

The incinerator for infectious waste disposal is located next to the landfill. The Municipality collects all infectious waste in a special truck. The collection and disposal fee for infectious waste is higher than for non-hazardous waste and many of the small infectious waste generators are not willing to pay for this service.

8. Nakhon Rachasima Metropolitan Municipality

General Profile

Nakhon Ratchasima Metropolitan Municipality is in the province of Nakhon Rachasima in the northeastern region of Thailand. Nakhon Rachasima Municipality is situated at a height of 150-300 m

above sea level and is about 255 km from Bangkok. The province has a total area of 20,493.964 km², which is about 12.12% of all the land in the northeastern region. Most employed persons in Nakhon Rachasima Province work in the agricultural, hunting, and forestry sectors, followed by the production and the wholesale/retail sectors.

Nakhon Rachasima Metropolitan Municipality is in Muang District, which is divided into 24 Sub-Districts. The Municipality covers 37.50 km² and has a total population of 174,322.

Solid Waste Management

Nakhon Rachasima Metropolitan Municipality has designated land for a new sanitary landfill. However, as in Khon Kaen, this landfill could not be developed due to public opposition. As an alternative, the Municipality is using Army property as a temporary dump, while negotiating with nearby residents to propose a new sanitary landfill site. Hazardous waste is collected separately and sent to a privately owned hazardous waste disposal company.

The two main problems in solid waste management in Nakhon Rachasima Municipality are: (1) low population awareness of solid waste separation, and (2) the low rate of fee collection (about 30%).

9. Ubon Rachathani Metropolitan Municipality

General Profile

Ubon Rachathani Metropolitan Municipality is in Ubon Rachathani Province, about 630 km northeast of Bangkok. Most of the land in the province is highlands. The Mae Kong River forms the border between the province and the People's Democratic Republic of Laos. The majority of the population works in the agricultural sector, mostly in livestock farming, simple agricultural processing, agricultural services, fishery, and forestry.

Ubon Ratchathani Metropolitan Municipality covers an area of 29.04 km², with a population of 105,150 in 2001. There is a high population density, comprising residential and commercial use, in Muang District.

Solid Waste Management

The solid waste generated in the Metropolitan Municipality is 85-100 tons/day. As some areas of the Municipality are not covered by collection services, due to the narrow roads, only about 80% of solid waste generated is collected. This leaves about 17 - 20 tons of waste uncollected each day.

The Metropolitan Municipality has been disposing of its solid waste in an open dump on Army property at Warin Cham Rab District, about 6 km from the Municipality, for more than 10 years. In 1997, a new landfill located in Don Meo village was constructed. However, it could not become operational due to political problems. So the Municipality continued to use the previous landfill, which began to overflow. The landfill site has since been filled up and the Army has asked the Municipality to conclude operations at the site. The Metropolitan Municipality now has to dispose of solid waste via the Warin Cham Rab Municipality with a service charge of 130 Baht/ton.

10. Rayong Metropolitan Municipality

General Profile

Rayong Metropolitan Municipality is in Rayong Province on the east coast of Thailand, about 179 km from Bangkok. It is divided into 4 sub-districts (Ta Pradu, Nuen Pra, Cheng Nuen, Pak Nam) which cover an area of 16.95 km². The population of the Municipality in 2001 was 55,942. Most of the people in this Municipality work in the tourism and industrial sectors.

Solid Waste Management

All solid waste is collected and disposed of in a sanitary landfill located in the Pak Nam sub-district. The Metropolitan Municipality policy focuses on solid waste management and it promotes many successful solid waste programs including a solid waste bank, organic waste separation, trading waste for eggs, and hazardous waste separation. All hazardous waste is separated at home and picked up separately before being sent to a hazardous waste disposal company.

Reported problems of solid waste management in the Rayong Metropolitan Municipality are minor. They include: (1) a shortage of collection/disposal equipment, and (2) an odor problem during the rainy season due to the inefficient drainage system.

Rayong Metropolitan Municipality has it own sanitary landfill site with a total area of 38.5 rai with about 10 rai unused. The landfill is sufficient to accept all the waste that is delivered to it (c. 72 tons/day). The landfill is municipality operated using bulldozers and soil from the site to cover the solid waste daily. The landfill has an HDPE liner and a leachate drainage and treatment system. The groundwater is monitored via 2 monitoring wells and monitoring is performed twice a year. The landfill has a fence around it and, to date, there are no scavengers living in the landfill. Only 35 scavengers are working during the daytime. The landfill management is effective and no problems concerning the landfill have been reported.

11. Kanchanaburi Municipality

General Profile

Kanchanaburi is located where the Kwae Yai and the Kwae Noi Rivers unite to form the Mae Klong River and is 130 km from Bangkok. It is very well known for its historic sites and natural areas. Kanchanaburi Municipality is divided into 5 sub-districts (Ban Neua, Ban Tai, Thalaw, Pakprak and Tha Makham), which cover an area of 9.16 km². The population of the municipality in 2001 was 39,065.

Solid Waste Management

The Municipality takes care of the collection and disposal of all solid waste. Kanchanaburi Municipality has a sanitary landfill located in the Nongrong sub-district of the Panomthon District. However, this site is not operational due to local opposition. Currently, the municipality disposes all of its solid waste – including hazardous waste – in a nearly full open dump site in the Pak Prak sub-district. The total area of the 80 rai landfill in use is 70 rai.

The site has a clay liner, no leachate drainage and treatment system and no groundwater monitoring. The landfill is operated using bulldozers and the surface is left open until the pit is full before covering it with soil. The landfill has no fence around it and 10 scavengers are found in the landfill.

Among the 13 municipalities, Kanchanaburi has, at 6.3%, the lowest expenditure on SWM as a percentage of total municipal expenditure.

12. Hatyai City Metropolitan Municipality

General Profile

Hatyai is the largest district in Songkhla Province in the south of Thailand. The district has grown into the commercial, transportation, communication, educational, and tourism center of the south and it was declared a municipality in 1995. The city of Hatyai covers an area of 21 km^2 and is 28 km from the city of Songkhla. It is the gateway to the neighboring countries of Malaysia and Singapore. Hatyai is a well-known tourist destination, catering to approximately 2,300,000 tourists annually. About 800,000 of these are from overseas and the rest are Thai. The annual income generated from tourism is about 20,000 million Baht per year.

The records kept during the past five years indicate that the Hatyai Metropolitan Municipality population has remained practically unchanged. In 2001 it was 157,806. The unregistered population is estimated to be around 150,000.

Solid Waste Management

The city operates its own solid waste collection and disposal. The solid waste disposal site has an odor and an insect problem. Due to limited funds, the city claims that it is not possible to fund a cover for the site and so they leave the surface open until the pit is full. It is expected to reach capacity in April 2003. The Municipality has designated land for a new sanitary landfill, but due to public opposition it remains undeveloped.

Even though Hatyai City is a commercial center, the city was not well planned and the roads are narrow and unorganized. Due to the narrow roads and high level of traffic during the daytime, solid waste collection is carried out at night. During the daytime, solid waste is left at the curbside, creating an unpleasant sight. Among the 13 municipalities, Hatyai has the greatest number of collection staff at 1.90 staff/ton.

At present, all solid waste is disposed of in a 135 rai controlled dump at Kuan Lung sub-district. Hazardous waste is separated out. The landfill has a clay liner and a leachate drainage and treatment system. Monitoring of the groundwater (drawn from 10 monitoring wells) is performed two times a year. The landfill is operated using bulldozers and soil from outside the site to cover the solid waste. The landfill has a fence around it, but there are still a large number of scavengers (c. 120) working in the landfill. The landfill management is effective and no problems about the landfill have been reported. Hazardous waste is not accepted at this landfill.

13. Surat Thani Municipality

General Profile

Surat Thani is the largest and most important province in the South, located 644 km from Bangkok. It has high plateaus and mountains covered with valuable wood forest to the west and low basins in the central and eastern seashore area. There are a large number of islands along the coast and two major rivers, the Tapi and Phum Duang.

Surat Thani Municipality covers an area of 69 km^2 and in 2001 had a registered population of 114,840. The area covers 6 sub-districts: Talad, Makham Tia, Bang Bai Mai, Bang Chana, Bang Soong and Klong Chanak. Four poorer districts are found in Surat Thani Municipality: Vipawadi Military Camp Community, Nong Bua Community, Lhang Klang Community and Si Thani -Yang Ngam Community.

Solid Waste Management

The Municipality takes responsibility for the collection and disposal of all solid waste. The landfill operated for more than 20 years by the Municipality reached its capacity some time ago. The Municipality sought and assigned land for a new sanitary landfill, but this could not be developed due to public opposition. Therefore, the Municipality extended the capacity of the old landfill by hiring a private company to evacuate decomposed soil (without knowing where this soil then went) to make more room for additional solid waste. This site could dispose of 160 tons of solid waste daily. The site contains 4 pits. An HDPE liner was used in one pit and clay liners were applied to the others. The landfill has a leachate drainage and treatment system and groundwater monitoring had been carried out three times a year. Bulldozers cover the solid waste with soil from the site. Despite the fence around the landfill, 20 scavengers are reported.

At present, all solid waste is disposed of at a 40 rai open dumpsite that does not offer hazardous waste separation. There is no hazardous waste separation before disposal; therefore, there is a possibility of hazardous waste contamination near the landfill area.

Among the 13 municipalities, Surat Thani, together with Kanchanaburi, has the lowest operating and maintenance cost at 388 baht/ton. The operating cost/operating revenue from fees is 8:1 baht.

Annex D: Municipal Tariff Structures

Municipal tariff structures were not available for Lampang, Phitsantulok and Ubon Rachathani Municipalities.

Chiang Mai Metropolitan Municipality

Descriptions	Baht
Monthly collection fees for buildings and complexes	
a. Less than 20 liters/day (charge per month)	40
b. Between 20-500 liter/day (per 20 liter)	40
c. Between 500 liter-1 m^3/day (charge per month)	2,000
d. Additional charged per every 0.0-1 m^3	2,000
Collection fees for markets, industrial plants or any place that produces a large amount of waste	
a. Less than 1 m^3/day (charge per month)	2,000
b. More than 1 m^3/day (charge per month)	1,000
Collection fees charged by the trip	
a. Less than 1 m^3/trip	150
b. More than 1 m^3/trip charge per additional 0.0-1 m^3	150
Collection fees for sanitary/fecal waste by the trip	
a. First 1 m^3 (charge per trip)	250
b. Additional charge for every 0-0.5 m^3 addition	150
c. Additional charge for every 0.5-1.0 m^3 addition	250
Collection fees for infectious waste	
a. Monthly Fees	
-Less than 2 kg or less than 13 liter	300
-Additional charge per every 0-2 kg or every 0-13 liter	300
b. Collection and disposal fees per trip	
-Additional charge for waste less than 75 kg or 500 liter	3,000
-Additional charge for waste more than 75 kg or more than 500 liter	400
(charged by every 0.0-75 kg or 0.0-500 liter)	400

Phuket Metropolitan Municipality

Descriptions	Baht
Collection fees for household waste	
a. Monthly price for buildings an complexes	
20 liter/day (charge per month)	30
b. Additional charge for every addition 0-20 liter	30
Collection fees for household waste	
a. 500-1,000 liter/day	1,500
b. Additional charge every addition 0-1,000 liter	1,500

Nonthaburi Metropolitan Municipality

Descriptions	Baht
Collection fees for household waste	
Monthly price for buildings and complexes	
a. 20 liter/day (charge per month)	20
b. Between 20-40 liter/day (charge per month)	40
c. Between 40-60 liter/day (charge per month)	60
d. Between 60-80 liter/day (charge per month)	80
e. Between 80-100 liter/day (charge per month)	100
f. Between 100-200 liter/day (charge per month)	200
g. Between 200-300 liter/day (charge per month)	300
h. Between 300-400 liter/day (charge per month)	400
i. Between 400-500 liter/day (charge per month)	500
j. Between 500 liter and 1 m^3 (charge per month)	1,500
k. Charge per every additional 0.0-1 m^3	2,000
Collection fees charged by the trip	
a. Less than 1 m^3/trip	150
b. More than 1 m^3/trip charge per additional 0.0-1 m^3	150
Collection fees for sanitary/fecal waste by the trip	
a. First 1 m^3 (charge per trip)	250
b. Additional charge for every 0-0.5 m^3 addition	150
c. Additional charge for every 0.5-1.0 m^3 addition	250
Permission license fees	
a. Collection and transport of waste license (per license)	5,000
b. Disposal license (per license)	5,000
c. Portable Restroom setup license (per license)	1,000
d. Portable Restroom Mobile license (per license)	1,000

Pattaya City

Descriptions	Baht
Collection fees for household waste	
a. Monthly price for buildings an complexes 20 liter/day (charge per month)	20
b. Between 20-40 liter/day (charge per month)	20
a. Between 40-160 liter/day (charge per month)	30
b. Between 160-260 liter/day (charge per month)	35
c. Between 260-500 liter/day (charge per month)	40
d. Between 500 liter and 1 m^3 (charge per month)	1,500
e. Additional charged per every 0.0-1 m^3	1,500
Collection fees charge by the trip	
a. Less than 1 m^3/trip	150
More than 1 m^3/trip charge per additional 0.0-1 m^3	150
Collection fees sanitary/fecal waste by the trip	
a. First 1 m^3 (charge per trip)	100
b. Additional charge for every 0-0.5 m^3 addition	75
c. Additional charge for every 0.5-1.0 m^3 addition	100
Permission license fees	
a. Collection and transport of waste license (per license)	5,000
b. Disposal license (per license)	5,000

Khon Kaen Metropolitan Municipality

Descriptions	Baht
Collection and Disposal of Infection Waste	
a. Monthly collection and disposal fees	
-Less than 2 kg or less than 13 liter	300
-More than 2 kg or more than 13 liter, the fee will be charged for every 0.0-2 kg or	
0.0-13 liter	300
b. Collection and disposal fees per trip	
-Travel distance less than 50 km	3,000
-Additional charge for waste less than 75 kg or 500 liter	400
-Additional charge for waste more than 75 kg or more than 500 liter, will be charged by every 0.0-75 kg or 0.0-500 liter	400
c. Disposal fees with permission to collect and transfer (charge by the kg)	16
Permission license fees (the certificate follows Title 19)	
a. Collection and transport of waste license (per license)	5,000
b. Disposal license (per license)	5,000
c. Collection and transport of infection waste (per license)	10,000
d. Disposal of infection waste (per license)	10,000

Nakhon Ratchasima Metropolitan Municipality

Descriptions	Baht
Collection fees for household waste	
a. Monthly price for buildings an complexes 20 liter/day (charge per month)	20
b. Between 20-40 liter/day (charge per month)	50
c. Between 40-60 liter/day (charge per month)	80
d. Between 60-80 liter/day (charge per month)	120
e. Between 80-100 liter/day (charge per month)	160
f. Between 100-200 liter/day (charge per month)	300
g. Between 200-300 liter/day (charge per month)	500
h. Between 300-400 liter/day (charge per month)	750
i. Between 400-500 liter/day (charge per month)	1,000
j. Between 500-750 liter/day (charge per month)	1,500
k. Between 750-1,000 liter/day (charge per month)	2,000
l. Charge for every additional 250 liter	500
Collection fees charge by the trip	
a. Less than 1 m^3/trip	150
b. More than 1 m^3/trip charge per additional 0.0-1 m^3	150
Permission license fees	
a. Collection and transport of waste license (per license)	5,000

Rayong Metropolitan Municipality

Descriptions	Baht
Collection fees for household waste	
a. Monthly price for buildings an complexes	
20 liter/day (charge per month)	10
b. Between 20-40 liter/day (charge per month)	40
c. Between 40-60 liter/day (charge per month)	50
d. Between 60-80 liter/day (charge per month)	100
e. Between 80-100 liter/day (charge per month)	120
f. Between 100-200 liter/day (charge per month)	160
g. Between 200-300 liter/day (charge per month)	280
h. Between 300-400 liter/day (charge per month)	360
i. Between 400-500 liter/day (charge per month)	500
j. Between 500 liter and 1 m^3 (charge per month)	2,000
k. Additional charged per every 0.0-1 m^3	2,000
Collection fees charge by the trip	
a. Less than 1 m^3/trip	150
More than 1 m^3/trip charge per additional 0.0-1 m^3	150
Collection fees sanitary/fecal waste by the trip	
a. First 1 m^3 (charge per trip)	250
b. Additional charge for every 0-0.5 m^3 addition	150
c. Additional charge for every 0.5-1.0 m^3 addition	250
Permission license fees	
a. Collection and transport of waste license (per license)	5,000
b. Disposal license (per license)	5,000

Kanchanaburi Municipality

Descriptions	Baht
Collection fees for household waste	
a. Monthly price for buildings an complexes	
20 liter/day (charge per month)	20
b. Between 20-40 liter/day (charge per month)	40
c. Between 40-60 liter/day (charge per month)	60
d. Between 60-80 liter/day (charge per month)	80
e. Between 80-100 liter/day (charge per month)	100
f. Between 100-200 liter/day (charge per month)	150
g. Between 200-300 liter/day (charge per month)	200
h. Between 300-400 liter/day (charge per month)	300
i. Between 400-500 liter/day (charge per month)	500
Collection fees for market, industrial plant or any place that produces a large amount of waste	
a. Less than 1 m^3/day (charge per month)	2,000
b. More than 1 m^3/day (charge per month)	1,000
Collection fees charge by the trip	
a. Less than 1 m^3/trip	150
b. More than 1 m^3/trip charge per additional 0.0-1 m^3	150
Collection fees sanitary/fecal waste by the trip	
a. First 1 m^3 (charge per trip)	250
b. Additional charge for every 0-0.5 m^3 addition	150
c. Additional charge for every 0.5-1.0 m^3 addition	250
Permission license fees	
a. Collection and transport of waste license (per license)	5,000
b. Disposal license (per license)	5,000

Hatyai City Metropolitan Municipality

Descriptions	Baht
Collection fees for household waste	
a. Monthly price for buildings an complexes	
20 liter/day (charge per month)	20
Additional charged per every 0.0-20 liter	20
b. Between 500 liter and 1 m^3 (charge per month)	1,000
Additional charged per every 0.0-1 m^3	1,000
Collection fees charge by the trip	
a. Less than 1 m^3/trip	100
More than 1 m^3/trip charge per additional 0.0-1 m^3	100
Collection fees sanitary/fecal waste by the trip	
a. First 0-1 m^3 (charge per trip)	100
b. Additional charge for every 0-0. 1.0 m^3	50

Surat Thani Municipality

Descriptions	Baht
Collection fees for household waste	
a. Monthly price for buildings an complexes	
20 liter/day (charge per month)	20
b. Between 20-40 liter/day (charge per month)	30
c. Between 40-60 liter/day (charge per month)	50
d. Between 60-80 liter/day (charge per month)	75
e. Between 80-100 liter/day (charge per month)	160
f. Between 100-200 liter/day (charge per month)	240
g. Between 200-300 liter/day (charge per month)	400
h. Between 300-400 liter/day (charge per month)	560
i. Between 400-500 liter/day (charge per month)	720
j. Between 500 liter and 1 m^3 (charge per month)	2,000
k. Additional charged per every 0.0-1 m^3	2,000
Collection fees charge by the trip	
a. Less than 1 m^3/trip	150
b. More than 1 m^3/trip charge per additional	
0.0-1 m^3	150
Collection fees for sanitary/fecal waste by the trip	
a. First 1 m^3 (charge per trip)	250
b. Additional charge for every 0-1.0 m^3 addition	150
Lump sum collection fees	
a. Residences, Offices, Commercial and	
Corporations (charge per truck per trip)	500
b. Governmental Institutions (charge per truck per trip)	500
c. Residence of Municipality Employees	
(charge per truck per trip)	400
d. Hospital, Hotel, other places that produces a	
large amount of waste (will be charge by the trip)	300
Permission license fees (the certificate follows Title 14)	
a. Collection and transport of waste license (per license)	5,000
b. Disposal license (per license)	5,000

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FUEL QUALITY BEST PRACTICE OVERVIEW:

APPLICATION TO VIETNAM'S FUEL QUALITY STRATEGY

June 2005

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FUEL QUALITY BEST PRACTICE:
APPLICATION TO VIETNAM'S FUEL QUALITY STRATEGY

REPORT 1

Contents of Report

SUBJECT PAGE

1. Background

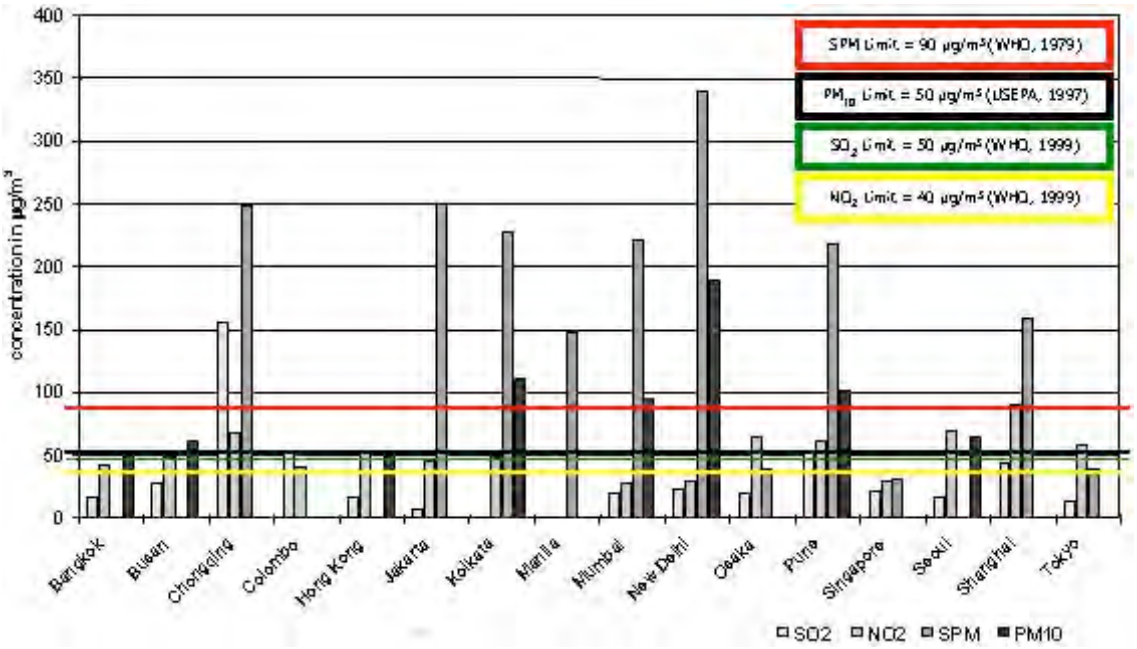
In October-November 2003, a training manual was developed by the International Fuel Quality Center (IFQC) in collaboration with CAI-Asia was developed as a comprehensive reference guide to support drafting national fuel quality strategies. This manual was developed to complement training sessions given to six Asian countries in the process of drafting solutions to air quality problems from mobile sources. Vietnam was one of the countries that participated in this workshop. This *Fuel Quality Best Practice Overview* is part of Vietnam's fuel quality standard development process. The material in this overview is largely founded on material and information from this workshop and the complementing manual, as well as from the IFQC's own benchmarking analysis of fuel quality standard development in the Asian region and Europe. This overview attempts to demonstrate the current globally accepted rational for setting fuel quality specifications and the best practice in doing so across the globe with a focus on the Asian region so as to demonstrate that Vietnam is amongst like minded countries in its efforts to set fuel quality standards.

Air Quality Issues and Costs

Multiple sources cause or contribute directly to air pollution. These include large stationary sources such as factories, power plants, smelters and refineries; smaller sources such as dry cleaners, fuelling facilities and degreasing operations; mobile sources such as cars, buses, planes, trucks, and trains; and natural sources such as wildfires, volcanoes and plants. Rapid urbanization, combined with a rapid growth in vehicle ownership and vehicle use has contributed to a situation in which most cities across the globe have some type of air quality problem. Asian cities suffer from the same plight. Figure 1 below provides an overview of the ambient levels of a number of key pollutants in major Asian cities. These key pollutants are sulfur dioxides (SO2), nitrogen oxides (NO2), suspended particulate matter (SPM), and particulate matter (PM). Air pollution in Asian cities comes from different sources such as mobile sources; stationary sources or from smaller area sources, such as home cooking and garbage burning. In many Asian cities, mobile sources are the most significant contributor to air pollution. This is especially so for PM, carbon monoxide (CO) and NOx, the pollutants most often found to exceed the ambient air quality standards.

While the growth in mobility in Asia is a strong positive indicator in Asian countries of their continued economic development, at the same time, this exacerbates their air quality situation. In many cases, air quality in Asian cities does not meet the standards set by World Health Organization (WHO). Pollution levels above the WHO standards mean that the health of people breathing the air is negatively affected. It is clearly documented in medical journals and governmental studies that poor air quality not only impacts the environment but also health in particular the respiratory system in the youngest and oldest population age groups, hospitalisation for heart or lung diseases, and even premature death. This results in considerable financial and economic costs for households and Asian economies.

Figure 1: Average Annual Pollution Concentrations for some Asians Cities (2000-2001)



Source: Asian Development Bank, 2004

Table 1 below provides a summary of the local and global impacts of all air pollutants, including the major human health, environmental, and climate change impacts.

Table 1: Summary of major pollutants from transportation sources

Pollutants	Local Impacts	Global Impacts	Comments
Lead	Impairs the normal intellectual development and learning ability of children	Ground water pollution and particulates in air	
CO	Aggravates existing cardiovascular diseases, impairs visual perception and dexterity	Indirect influence on warming through competition with methane for oxidation	Transportation can be responsible for up to 95% of CO emissions in urban areas. Globally distributed gas HC
HC	Range of health impacts including respiratory, neurological & carcinogenic Photochemical smog precursor	Class of compounds includes methane, a potent greenhouse gas Indirect warming influence through ozone formation	A range of natural and anthropogenic sources ensures that HC species are generally available as ozone precursors NOx

Pollutants	Local Impacts	Global Impacts	Comments
NOx	Respiratory irritant Visibility impairment Acid precursor Photochemical smog precursor	Indirect warming influence through ozone formation	Acid and ozone production impacts of NOx can be widely distributed through long-range transport of reservoir species O3
O3	Primary constituent of photochemical smog Severe respiratory impacts Material & crop damage	Global warming impacts due to increasing background concentrations	O3 has no direct emissions sources—NOx, HC, and sunlight are required for production SOx
SOx	Respiratory irritant Visibility impairment Acid precursor	Sulphate has some cooling impact due to light scattering	SO2 has a relatively long atmospheric lifetime leading to widespread acid impacts PM
Benzene	Classified as a human carcinogen (Group 1) by the International Agency for Research on Cancer		
PM	Cardiovascular & respiratory impacts Visibility impairment Includes acid species	Particles can influence warming or cooling, depending on carbon content & scattering abilities	Atmospheric lifetime varies with particle size GHG
GHG		Leading to global warming through long-term atmospheric accumulation	Transportation is a major source of CO2 but less important for methane & N2O

Source: ICCT and IFQC data, 2003

In addition, the estimated costs related to health issues from air pollution have been documented by national and international organisations. For example, the World Bank Environment Monitor Reports (2002) for the Philippines and Thailand show that health-related air pollution costs amounted to US$392 million for Metro Manila in 2001 and US$424 million for Bangkok in 2000. World Health Organization estimates of mortality indicate that on a yearly basis about 800,000 people die prematurely because of exposure to urban outdoor air pollution. Of these, about 500,000 are believed to be in Asia as seen in Table 2.2 below. The burden of disease expressed in Disability Adjusted Life Years (DALY) indicates that out of the 6.4 million affected, 3.8 million are in Asia. Air pollution can also significantly affect ecosystems. For example, ground-level ozone has been associated with reductions of agricultural and commercial forest yields, and airborne releases of NOx are one of the largest sources of nitrogen pollution in certain water bodies. Like health costs, such damage is also a cost burden on society.

Table 2: Mortality (premature deaths) in Asia

Environmental Risks	Global Estimate	Asian Estimate	Asia as a percent of Global
Unsafe water	1,730,000	730,000	42%
Urban Outdoor Air	799,000	487,000	61%
Indoor Air	1,619,000	1,025,000	63%
Lead	234,000	88,000	37%

Source: WHO, 2002

However, despite implementing the World Health Organization's (WHO) Air Quality Guidelines issued in 1999, many countries are not meeting their health-based standards for CO, NO2, sulfur dioxide and ozone, exceeding them in some cases by a factor of two. Although Sulfur dioxide (SO2) and nitrogen dioxide (NO2) ambient levels are dropping in many countries because of stationary and mobile source programs, ozone and particulate matter pollution are a serious problem around the world, even in developed countries that have taken aggressive action to reduce this kind of pollution. The countries that have phased out leaded gasoline have experienced a massive drop in lead emissions. Lead use is currently concentrated in just a few regions of the world, including Africa, Eastern Europe and parts of Asia. We expect the global lead phase out to be essentially complete (except for parts of Africa) by 2006. In addition, other key pollutants such as CO and HC have been reduced significantly in countries that have phased out lead and have introduced vehicle emission control equipment such as catalytic converters. In many cities across the globe, vehicles are the main source of air pollution, although there are differences with respect to the type of vehicles that are contributing the most to transport related air pollution. In some cases it is diesel-fuelled busses, while in other cases, especially in urban city centres, it is gasoline fuelled two-stroke vehicles.

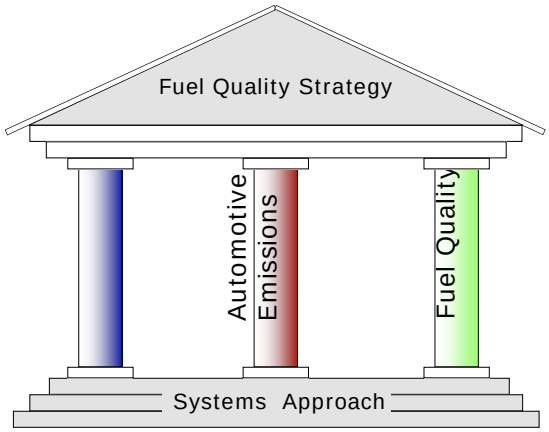
It is important to note that the way in which countries across the globe have reacted and will react in the future to mobile source related air pollution and urban air quality issues is context specific and is influenced by a variety of factors including:

- Key air pollutants
- Climate change
- Energy security issues
- The structure of their automotive and energy sectors
- Socio economic
- Political factors

II. The Systems Approach:
A Best Practice Approach

Across the globe, comprehensive fuel quality strategies and ultimately the setting of fuel quality specifications are based upon the "systems approach". The "systems approach" was initially conceived and implemented in the United States but is now implemented across the world. This approach focuses on three main pillars as seen below in Figure 1.2.

Figure 2: The "Systems Approach"



Source: Sandrine Dixson-Decleve, International Fuel Quality Center (IFQC), 2003.

As shown above, it is these three pillars, based on the "systems approach", which are the foundation for a successful fuel quality strategy. Each pillar although a separate entity is dependent on the other to up-hold the resulting fuel quality strategy. The impact of a vehicle on air quality is directly linked to the type of engine and after treatment technology on that vehicle and the quality of the fuel used in the engine. Therefore, the development of a fuel quality strategy must first be based on meeting certain air quality objectives. Once these objectives are defined and source apportionment has occurred e.g. the actual impact of transport on urban air pollution has been calculated, determination can be made of which automotive emissions must be reduced and by how much. This in turn will determine engine technology needs and the quality of fuels necessary to enable the engine and/or after treatment technology to meet the emission requirements.

Asian countries are at different stages when it comes to setting and revising emission standards. Most Asian countries are either currently implementing or planning to implement the European standards for automotive emissions and fuel quality. As the Asian region has predominantly followed the European approach it is worthwhile to take a look at how the EU regulates automotive emissions.

In the EU, motor vehicle emissions are regulated by Directive 70/220/EEC (light vehicles) and 88/77/EC (heavy vehicles) and amendments to those directives. The first set of amendments through the 1980's and 1990's established the Euro 1-2 standards for light duty and heavy-duty vehicles. A series of amendments have been issued to gradually tighten the original Euro 1 and 2 standards, mainly as a result of the EU Auto-Oil Programme I and II findings. The Auto-Oil Programme also resulted in legislation on durability. That is that a manufacturer is responsible for emissions from light duty vehicles during the first five years or 80,000 kilometres

(whichever occurs first) of use, providing the vehicle is properly maintained, and on the use of onboard diagnostic (OBD) systems.

Directive 98/69/EEC Relating To Measures to Be Taken Against Air Pollution from Motor Vehicles and Amending Council Directives 70/156/EEC and 70/220/EEC is the most important piece of legislation on vehicle emissions. Directive 98/69/EC went into effect in September 1999. Its promulgation was coordinated *with Directive 98/70/EC on Gasoline and Diesel Fuel Quality* (CEN standards EN228-1999 for gasoline and EN 590-1999 for diesel), which set stricter standards for fuel quality for 2000 and 2005. The 2005 fuel requirements were then amended by Directive 2003/17/EC calling for 10ppm sulfur availability in 2005 in both gasoline and diesel and 10ppm gasoline fuel Europe-wide by 2009 the diesel date left to be confirmed. These requirements were then translated into the European standards EN 228-2004 and EN 590-2004.

Directive 98/69/EC covers what is commonly known as Euro 3 and Euro 4 emission standards. Euro 3 regulates five vehicle classes: 1) passenger vehicles less than 2.5 tonnes; 2) passenger vehicles greater than 2.5 tonnes; 3) transport vehicles less than 3.5 tonnes; 4) transport vehicles greater than 3.5 tonnes but less than 12 tonnes; 5) transport vehicles greater than 12 tonnes.

Also, Directive 1999/96/EC amended Directive 88/77/EEC and went into effect in February 2000. This Directive set more stringent emission standards for heavy-duty vehicles and buses for 2000, 2005 and 2008. The European Commission estimates the 2000 limits will result in a 30% reduction over previous emission levels. Two new test cycles are included and limits for non-methane hydrocarbons and methane were introduced for gas engines. The limits for 2005 set even more stringent limits for particulate matter to push manufacturers into using particulate trap technology. In 2008, more stringent nitrogen oxide limits will be introduced.

The Euro emission standards are given in the tables below:

Table 3.1: EU Passenger Car Limits (type approval), 1970 -. All limits in either g/km or g/test as indicated.

Gasoline Cars							
Directive	Year	Euro ?	CO	HC	NOx	HC+NOx	Units
98/69	2005	Euro 4	1	0.1	0.08		g/km
98/69	2000	Euro 3	2.3	0.2	0.15		g/km
94/12	1996	Euro 2	2.2			0.5	g/km
							g/km
91/441	1991	Euro 1	2.72			0.97	g/km
88/436 (> 2.0 l)	1990		25		3.5	6.5	g/test
88/436 (1.4 - 2.0 l)	1990		30			8	g/test
88/436 (< 1.4 l)	1990		45		6	15	g/test
88/76 (> 2.0 l)	1988		25		3.5	6.5	g/test
88/76 (1.4 - 2.0 l)	1988		30			8	g/test
88/76 (< 1.4 l)	1988		45		6	15	g/test
83/351	1983		84			23.5	g/test

Source: International Fuel Quality Center (IFQC), from the European Commission 2002.

Table 3.2:. EU Passenger Car Limits (type approval), 1970 - . All limits in either g/km or g/test as indicated.

Diesel Cars								
Directive	year	Euro ?	CO	HC	NOx	HC+NOx	PM	Units
98/69	2005	Euro 4	0.5	0.05	0.25	0.3	0.025	g/km
98/69	2000	Euro 3	0.64	0.06	0.5	0.56	0.05	g/km
94/12 **DI**	1996	Euro 2	1			0.9	0.1	g/km
94/12 **IDI**	1996	Euro 2	1			0.7	0.08	g/km
91/441	1991	Euro 1	2.72			0.97	0.14	g/km
88/436 (> 2.0 l)	1990		25		3.5	6.5	1.1	g/test
88/436 (1.4 - 2.0 l)	1990		30			8	1.1	g/test
88/436 (< 1.4 l)	1990		45		6	15	1.1	g/test
88/76 (> 2.0 l)	1988		25			6.5		g/test
88/76 (1.4 - 2.0 l)	1988		30			8		g/test
88/76 (< 1.4 l)	1988		45			15		g/test
83/351	1983		84			23.5		g/test

Source: International Fuel Quality Center (IFQC), from the European Commission 2002.

Table 3.3: EU Heavy Duty Truck & Bus Limits (type approval), 1982 -. All limits in g/kWh.

HDV	Year	Euro	CO	HC	NMHC	CH4	NOx	PM	PM	Units	
Directive									<0,7 dm3 etc		Note
1999/96 C (EEV)	-	-	1.5	0.25	-	-	2	0.02	-	g/kWh	New cycle (ESC)
1999/96 C (EEV)	-	-	3	-	0.4	0.65	2	0.02	-	g/kWh	New cycle (ETC)
1999/96 B2	2008	Euro 5	1.5	0.46	-	-	2	0.02	-	g/kWh	New cycle (ESC)
1999/96 B2	2008	Euro 5	4	-	0.55	1.1	2	0.03	-	g/kWh	New cycle (ETC)
1999/96 B1	2005	Euro 4	1.5	0.46	-	-	3.5	0.02	-	g/kWh	New cycle (ESC)
1999/96 B1	2005	Euro 4	4	-	0.55	1.1	3.5	0.03	-	g/kWh	New cycle (ETC)
1999/96 A	2000	Euro 3	2.1	0.66	-	-	5	0.1	0.13	g/kWh	New cycle (ESC)
1999/96 A	2000	Euro 3	5.45	-	0.78	1.6	5	0.16	0.21	g/kWh	New cycle (ETC)
91/542 B	1996	Euro 2	4	1.1	-	-	7	0.15	0.25	g/kWh	13 mode cycle (and refer directive 96/1)
91/542 A	1991	Euro 1	4.5	1.1	-	-	8	0.36	0.61	g/kWh	13 mode cycle
88/77	1988	Euro 0	11.2	2.4	-	-	14.4	-	-	g/kWh	13 mode cycle
Reg 49	1980		14.2	2.5	-	-	18	-	-	g/kWh	13 mode cycle

Source: International Fuel Quality Center (IFQC), from the European Commission 2002.

Table 3.4: EU Light Commercial Vehicle Limits (type approval), 1991 -. All limits in g/km.

Gasoline light commercial vehicles							
Directive	Year	Euro ?	CO	HC	NOx	HC+NOx	Note
98/69 class I	2005	Euro 4	1	0.1	0.08		
98/69 class II		Euro 4	1.81	0.13	0.1		
98/69 class III		Euro 4	2.27	0.16	0.11		
98/69 class I	2000	Euro 3	2.3	0.2	0.15		
98/69 class II		Euro 3	4.17	0.25	0.18		
98/69 class III		Euro 3	5.22	0.29	0.21		
96/69 class I	1997	Euro 2	2.2			0.5	
96/69 class II	1997	Euro 2	4			0.6	
96/69 class III	1997	Euro 2	5			0.7	
93/59 class I	1991	Euro 1	2.72			0.97	
93/59 class II	1991	Euro 1	5.17			1.4	
93/59 class III	1991	Euro 1	6.9			1.7	
Class	Vehicle reference mass						
I	< 1250 kg						
II	1250 - 1700 kg						
II	> 1700 kg						

Source: International Fuel Quality Center (IFQC), from the European Commission 2002.

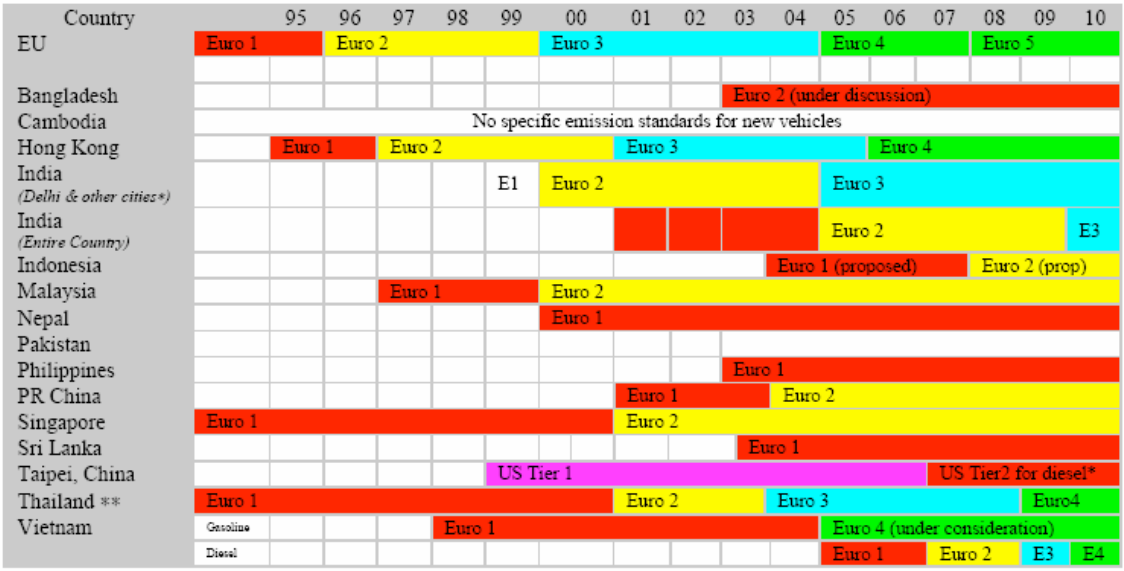
Table 3.5: EU Light Commercial Vehicle Limits (type approval), 1991 -. All limits in g/km

Diesel light commercial vehicles								
Directive	Year	Euro ?	CO	HC	NOx	HC+NOx	PM	Units
98/69 class I	2005	Euro 4	0.5		0.25	0.3	0.025	g/km
98/69 class II		Euro 4	0.63		0.33	0.39	0.04	g/km
98/69 class III		Euro 4	0.74		0.39	0.46	0.06	g/km
98/69 class I	2000	Euro 3	0.64		0.5	0.56	0.05	g/km
98/69 class II		Euro 3	0.8		0.65	0.72	0.07	g/km
98/69 class III		Euro 3	0.95		0.78	0.86	0.1	g/km
96/69 class I - **IDI**	1997	Euro 2	1			0.7	0.08	g/km
96/69 class I - **DI**	1997	Euro 2	1			0.9	0.1	g/km
96/69 class II - **IDI**	1997	Euro 2	1.25			1	0.12	g/km
96/69 class II - **DI**	1997	Euro 2	1.25			1.3	0.14	g/km
96/69 class III - **IDI**	1997	Euro 2	1.5			1.2	0.17	g/km
96/69 class III - **DI**	1997	Euro 2	1.5			1.6	0.2	g/km
93/59 class I	1991	Euro 1	2.72			0.97	0.14	g/km
93/59 class II	1991	Euro 1	5.17			1.4	0.19	g/km
93/59 class III	1991	Euro 1	6.9			1.7	0.25	g/km

Source: International Fuel Quality Center (IFQC), from the European Commission 2002.

As can be seen below in Figure 3, Asian countries are at various stages of applying the Euro standards. Although Japan's emission standards are of course among the most stringent in the world, Hong Kong also complies with Euro 3 emission standards, while most other Asian countries have adopted Euro 1 or 2, or U.S. Tier 0 standards. There are a few countries in the region such as Cambodia and Indonesia that have not set emission standards at all, although both countries are in the process of discussing the adoption of such standards.

Figure 3: Asia Pacific in Use Emission Standards for New Light-Duty Vehicles



Source: Asian Development Bank (ADB), 2003.

Note: * Gasoline vehicles under consideration. Euro 2 introduced in Mumbai, Kolkata and Chennai in 2001. Euro 2 in Bangalore, Hyderabad, Khampur, Pune and Ahmedabad in 2003, Euro 3 to be introduced in Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad and Ahmedabad in 2005. ** Heavy duty diesel standards: up to 1999: Euro 1, 2000 – 2005 Euro 2, 2006 onwards Euro 3

It is expected that during the next ten years there will be an annual GDP growth of 6%-7% in Vietnam, along with significant investments in infrastructure such as roads and bridges. Also expected is an annual vehicle growth rate of around 6%. This includes an increasing number of new vehicles, however at a lower growth rate than at present due to the importation of secondhand vehicles. As vehicle use increases so will emissions from transport.

Environmental Protection and Health

Protection of human health and the environment is the target for setting gasoline and diesel fuel quality standards. As the ownership of private vehicles and motorbikes increases in Vietnam the impact of their use on air quality and human health is also increasing. Therefore, the most effective way to reduce air pollution from vehicles is to implement vehicle emissions and fuel quality standards as the fuel and vehicle work together as a system. This is called the "systems approach" and aims to meet air quality goals. This approach has been successfully implemented in countries across the world including the USA, Europe and Asia.

It is well known that mobile source emissions are a significant cause of air pollution. Scientific research shows that vehicle emissions contribute to serious health and environmental effects. Besides lead pollution, emissions from gasoline powered vehicles include inorganic pollutants

such as CO, CO2, NOx, O3, SO2 and carbon particulates, and other organic pollutants like benzene, aldehydes and PAH-based (polyaromatic hydrocarbon) substances, which do not disintegrate easily and are probable carcinogens. In addition, heavy metals like Cd and Mn can also exist in emissions. Some of these compounds, such as benzene and metals, are mixed in gasoline and emitted to the air, while others such as dust, PAH and aldehyde are formed in the incomplete burning process of gasoline. These pollutants can cause several diseases, including respiratory system disease (from dust, PM10, CO); nerve disorders; cancer (from benzene, PAH, Cd) and blood disease (from Pb). Their impacts on the environment are considerable, and include contributions to the greenhouse effect, acid rain (SO2, NOx), and dust pollution (TSP).

Such pollutant emissions are associated with gasoline or diesel composition, as well as the mechanism for (or level of) the fuel's complete burning in an engine. The contribution of emissions from different vehicle types in Hanoi are given in table 3 below:

Table 3: Air Pollution by Vehicle Type in Hanoi

Air Pollution Contribution by Vehicle Type, Hanoi

Pollutant	Motorcycle	Gasoline vehicle	Diesel vehicle
CO	54.5%	45.2%	0.3%
HC	54.1%	44.9%	1%
Pb	54.5%	45.5%	
Dust	43%	35.3%	22%

Source: Hanoi DOSTE.

The introduction of cleaner fuels has an immediate impact on both new and existing vehicles in the market place. For example, new cars with tighter emission standards can take some ten to 15 years or even longer before they are able to penetrate the market in sufficient numbers to be fully effective, whereas lowering lead levels in gasoline reduces lead emissions from all vehicles immediately. However, not all fuel quality changes have the same dramatic effect in lowering the emissions of older vehicles. The introduction of vehicles with more advanced emission control technologies has by far the greatest effect on lowering emissions. Lowering sulfur levels enables these technologies to function properly and to obtain necessary emission reductions.

In Asia, some countries, such as India and Hong Kong have already issued medium-term policies outlining fuel quality targets and emission reductions to be achieved by 2013. Others are in the process of setting fuel quality or emissions reduction goals such as Malaysia and Thailand. Today, fuels used in Vietnam are imported from China, Thailand, Singapore, so standards for fuels are mostly adapted to fuel quality in these countries with a view to harmonising Vietnamese standards with the region. However, Vietnam is also in a position of strength as we can ask for the quality of fuel we want to import and by producing cleaner fuel post 2008 we can also export.

Let us not forget that the principal driver for change to fuel quality standards is environment and health, that is the need to provide fuels that facilitate the adoption of emerging vehicle engine and emission control technologies to reach more stringent emission standards and meet air quality requirements. Such standards need to be consistent with engine development practices and provide reliable and long-life compliance. Typical fuel quality parameters for gasoline and diesel can be seen below in Table 4 showing EU, California and WWFC fuel quality legislation.

Table 4: The Main Gasoline and Diesel Fuel Properties Affecting Emissions

Diesel	EU			USA			WWFC	
	EN: 228 1993/97 "Euro 2"	Dir. 98/70/EC 2000 "Euro 3"	Dir. 2003/17/EC 2005 "Euro 4" (*)	Conventional 2004	Phase 2 RFG 2000/ 2004	CARB Phase 3 2005	Category 3 1998	Category 4 2002
Aromatics, vol%. max.	-	42	35	-	-	35	35	35
Olefins, vol%. max.	-	21 / 18	18	-	-	10	10	10
Benzene, vol%. max.	5.0	1.0	1.0	-	1.0	1.1	1.0	1.0
Oxygen, wt. %, max.	-	2.7	2.7		1.5 – 3.5 / 2.1 average	1.8 – 3.5	2.7	2.7
Sulfur, ppm, max.	2000/500	150	5 / 10	300 / 80	300 / 80	30	30	5 - 10
RVP@37.8°C, kPa, min-max (**)	35 - 100	60 / 70	60 / 70	44 - 75	44 - 69	44 - 50	45 - 105	45 - 105
Lead, g/l, max.	0.013	0.005	0.005	0.013	0.013	0.013	Not detectable	Not detectable

Diesel	EU			USA			WWFC	
	EN:590 1993/97 "Euro 2"	Dir. 98/70/EC 2000 "Euro 3"	Dir. 2003/17/EC 2005 "Euro 4" (*)	Automotive Diesel No2 1993	Automotive Diesel No2 2006	CARB 1993 / 2006	Category 3 1998	Category 4 2002
Total aromatics, vol%. max.	-	-	-	35	35	10 - 20	15	15
Polyaromatics, wt% max.	N/A	11	11	-	-	-	2	2
Sulfur, ppm max.	2000/500	350	50 / 10	500	15 (on road)	500 / 15 (LA)	30	5 - 10
Cetane number min.	49	51	51	40	40	-	55	55
Density @ 15°C, kg/m3, min-max.	820 - 860	845 max	845 max	-	-	-	820 - 840	820 - 840
Distillation, T95, °C, max.	360	360	360	-	-		340	340

*__Review clause__: By end 2005 the European Commission will carry out a comprehensive review of the other non-sulfur parameters and alternative fuels and see if new specifications are necessary, the outcome of the various commitments with the auto-manufacturers to reduce fuel consumption and CO2 emissions of new passenger cars, the effect of metallic additives on new pollution abatement technologies, and the final date of on-road and non-road diesel 10ppm introduction.

2005 introduction of 10ppm sulphur – Fuel must be geographically available in an appropriately balanced manner

** depends on ambient temperature & season

Source: IFQC, 2005

III. Fuel Quality Developments in Vietnam

The secretariat of the Vietnamese standards body TCVN/TC28 "petroleum and petroleum products" has sent two diesel and gasoline draft standards for comment to all relevant stakeholders both private and public, and to external experts and organizations. It is hoped that the finalised standards will be published by mid 2005. Vietnam is looking to implement fuel quality changes in a similar time frame as countries in the region.

In addition, based on these discussions, and the planned launch of the two new Petro Vietnam refineries, the VSC would like to propose fuel quality specifications for gasoline (Annex I) and diesel (Annex II) for the next 5 year period. This will allow traders and Petro Vietnam to plan for the changes and make the proper investments or supply decisions. Confirmation of these standards and the exact date should be made after stakeholder workshops and internal government discussions in the near future.

Complementary to these fuel quality standards, and in respect of the "systems approach" the Vietnamese government 2004 plan on standardization includes the application of Euro regulations on vehicle emissions and stricter air quality targets. A road map for the adoption of Euro 2-4 is also in the process of being discussed.

Vietnam - Gasoline Fuel Quality Issues

In Vietnam 75% of passenger vehicles and all motorcycles use gasoline. There is a high fleet growth rate especially in the case of gasoline driven passenger cars and two and four stroke vehicles (cars: 7% , motorcycles: 15%). Today the following motorcycle types dominate the market: 9% Two-stroke; 91% Four-stroke.

Vietnam imports almost all its gasoline, and switched to unleaded gasoline on July 1st, 2000. Prior to the switch, the country consumed only two grades of gasoline, RON 83 and RON 92 and its quality was subject to TCVN 5690 (1998). Imports of unleaded gasoline now include RON 90, 92, and 95; the majority is RON 90 and 92, however imports of RON 83 will be maintained for the coming two to three years. The quality of imported unleaded gasoline is subject to: TCVN 6776:2000 where important criteria include (i) sulfur content of less than 0.15% weight, (ii) benzene content of less than 5% volume, and (iii) Pb content of less than 0.013 g/l. In addition, Petrolimex, the country's biggest importer of gasoline, ensures that the actual aromatics content is lower than 45% volume.

Vietnam - Diesel Fuel Quality Issues

In comparison with gasoline passenger car growth rates, only 25% of passenger vehicles are diesel driven. However, as diesel fuel sulfur content is rather high in Vietnam, the SO2 emitted by diesel burning engines can be also considerable. Pollutants caused by diesel vehicles are quite complicated and vary by type of oil, and include CO, CO2, hydrocarbons (benzene, toluene, alkybenzene, xylene, PAH, aldehyde), NOx, and sulfate.

Imported diesel oil is subject to TCVN 5689 2002, which specifies that the sulfur content in the 3 types of diesel fuel sold in Vietnam are equal or lower than 0.5% and to 0.25% weight

respectively. While some companies continue to import diesel with a sulfur content of up to 1%, since 2001, Petrolimex has only imported diesel fuel with sulfur content equal or less than 0.5%.

Gasoline and Diesel Import Activities

Today, Vietnam has no large-scale oil refineries and has produced only a small amount of unleaded gasoline RON 83 therefore almost all gasoline and diesel consumed at present must be imported. Major sources of petroleum imports are Singapore, PRC and Kuwait, and importation continues to be conducted by state-owned enterprises.

However, as of 2008 Vietnam will have the capacity to produce low and ultra low sulfur fuels as PetroVietnam brings on line their first refinery in Don Quat (Central Vietnam). By 2013 their second refinery will be completed in the North of Vietnam at Nghi Son. Both refineries are aiming to produce low (Don Quat) and ultra low (Ngi Son) sulfur fuels. Taking this into consideration it is recommended that Vietnam set a schedule for the implementation of lower sulfur fuels to promote production for domestic use and export to the Japanese market currently the largest importer of Vietnamese oil. Japan is a net importer of clean fuels at present.

I.V. Main Gasoline Specification Changes:
Best Practice

Octane number RON and MON

Vehicles are designed and calibrated for a certain octane value. There are two methods for determining octane number: Research Octane Number (RON) and Motor Octane Number (MON). Octane number is measure of gasoline's ability to resist auto-ignition. Theoretically the higher octane number the better, but it must be met with the performance of each type of engine. MON is related to high-temperature knock conditions. RON is related to mild-knock conditions at low speed. RON values are typically higher than MON and the difference between these values is the sensitivity, which is usually controlled in the range 10-12, again for good anti-knock reasons. To extract high performance and low fuel consumption, it is necessary to use high compression ratios and high engine revolutions, these are factors that increase the need for high MON. An inadequate MON will lead to destructive knock at high engine speeds. All existing engines are currently calibrated on MON. The importance of MON for car makers is to protect engines against high-speed knock and breakage. Any drop in MON, even slight, will put the integrity of engines at risk under extreme operating conditions.

Based on compiled data and and surveys reported on at the August 2004 Workshop organised by STAMEQ. The new draft TCVN unleaded gasoline standard requires 3 levels of RON and MON:

- RON 90/92/95 and
- MON 80/82/85

For reference purposes, refer to Table 5 below:

Table 5 - Octane number of gasoline in legislation or under an industry standard in other Asian countries

	RON	MON	(RON + MON)/2
China	90/93/95	-	85/88/90
India	88/93/91/95	81/85 (for 91/95 RON)	84/88
Malaysia	92/97	-	-
Philipines	81/87/93/95	reported	-
Singapore	92/98	-	-
Thailand	91/95	80/84	-
Indonesia	88/94/95/98	-	-
Taiwan	92/95/98	-	-
Japan	89/96	-	-
Hong Kong	95	85	-

Source: IFQC – Status of leaded gasoline phase out & octane requirements Worldwide, May 2004 and Fuel Quality Specification Booklet, January 2005

Lead in Gasoline

Lead is a good octane component but it is one of the most important environmental fuel quality parameters due to its impact on health and the environment. There are also a variety of growing automotive issues with leaded fuel such as high combustion chamber deposits, spark plug fouling, etc.

Taking into account the health and environmental effects linked to lead and the fact that Vietnam has banned leaded gasoline, it is proposed to further reduce lead levels to 0.005 in a second and third lead reduction phase in 2008 and 2013 respectively. Refer to Annex I and II.

Aromatics and Benzene

Aromatics can be found in both gasoline and diesel. In general aromatics are a good octane component for gasoline however they can be a source of benzene, NOx and particulate emissions. Also, heavier aromatics have been linked to engine deposit formation, particularly combustion chamber deposits. In general, reducing aromatics and T90 can enable reductions in exhaust mass NMHC and CO emissions to be achieved. The fuel aromatic content affects combustion and the formation of particulate and PAH emissions. Of particular concern among the general family of compounds we describe as "aromatics" is benzene, which is a known human carcinogen. Numerous studies have shown that the benzene and aromatics strongly influence exhaust benzene emissions. Control of benzene concentration is recognized to be the most direct and cost-effective way to limit benzene emissions. Benzene limits in China India, Malaysia, The Philippines, Thailand, Japan are as follows:

Table 6: Current Benzene levels in Asia

	China	India	Malaysia	Philippines	Thailand	Japan
Benzene, % v/v, max	2,5 (10/2004)	1-3,0 (cities and metros) 5.0 (2005) (countrywide (2000)	5 (1993)	2 (2003)	3,5 (2004)	1 (2005)

Source: IFQC, fuel specification booklet 2005

Taking into account the health and environmental effects linked to aromatics and benzene, the new draft TCVN unleaded gasoline standard reduces benzene from 5%v/v to 2.5%v/v max in 2005. A second and third gasoline aromatics and benzene reduction phase is also recommended in 2008 and 2013 respectively. Refer to Annex I and II.

Olefins

Olefins in gasoline are good octane components however, they are found to be sources of evaporative emissions and also can cause gum formation and engine deposit. The US EPA has declared that "NOX emissions were lowered by reducing olefins, raised when T90 was reduced."

Taking into account the engine deposit issues and health and environmental effects linked to olefins, the new draft TCVN unleaded gasoline standard defined olefins of 38%v/v max in 2005, which is the same level as China. A second gasoline olefins reduction phase is also recommended in 2008 and 2013. Refer to Annex I and II.

Oxygen Content

The oxygen parameter refers to the oxygen content allowed in fuel. This oxygen comes from fuel compounds called oxygenates. Oxygenates are used as octane boosters and volume extenders and include MTBE, ethanol, methanol, ETBE, TBA, Iso propyl alcohol, Iso butyl

alcohol to name but a few. They replace high-octane aromatic hydrocarbons and lead. The most well known oxygenates used today are MTBE, ethanol, ETBE (in Europe), Iso-octane/iso-octene and TBA. Adding oxygen carrying components to gasoline reduces the resultant fuel calorific value. For engines with non-sophisticated fuel metering systems, the mixture becomes leaner ensuring a more complete combustion and emissions reduction, whereas for engines with adaptive learning engine management systems, these will compensate thereby counter acting (neutralising) any effects of fuel composition.

Taking into account standard EU and US oxygen content levels and the high octane and good combustion properties of oxygenates, the new draft TCVN unleaded gasoline standard set a 2.7%wt max oxygen level in 2005.

Volatility: Distillation and Reid Vapour Pressure (RVP)

Distillation (or boiling range) is a reference to the volatility of the fuel. The distillation or boiling range of the fuel is a consequence of the chemical composition of the fuel meeting other fuel property requirements such as vapour pressure, viscosity, flash point, and density. Vehicle refuelling emissions are also strongly affected by fuel volatility.

Gasoline volatility indicates the ability of a fuel to vaporize either directly (through the measurement of vapour pressure at a particular temperature) or indirectly (through correlation with the distillation characteristics of the fuel). These distillation properties, along with the fuel's measured vapour pressure, are critical parameters in ensuring smooth engine starting, efficient fuel combustion and evaporative emission controls. In addition, the combination of correct vapour pressure and distillation characteristics is essential to prevent hot fuel handling problems such as vapour lock and carbon canister overload.

Reid Vapour Pressure (RVP) is identified as one of the most important parameters for evaporative emission (VOC) reductions contributing to low level ozone formation. RVP is directly impacted by the use of alcohols and thus an important parameter to look at when setting ethanol limits. RVP can be relaxed in cold climates as is the case under the EU Directive where arctic regions are allowed a higher RVP of 70 kPa, but not in warm regions where greater evaporative emissions occur in warm climates. In addition, as many Asian countries are considering the use of ethanol as an octane booster, it is important to note that ethanol is highly volatile when blended at lower levels to 10%.

Taking into account the volatility issues and thus VOC emissions linked to high RVP especially in warm climates such as Vietnam, it is hoped that the future roadmap will bring down maximum RVP allowances to a 60kPa summer and 70kPa winter maximum as in Europe and other Asian countries such as Hong Kong, Malaysia, Bangladesh, Indonesia, Philippines, Thailand and Taiwan. At present, the new draft TCVN unleaded gasoline standard sets RVP levels between 43-75kPa max as of 2005.

Sulfur Content

Sulfur naturally occurs in crude oil. Fuel sulfur affects the performance and durability of many exhaust treatment and on-board diagnostic systems on gasoline and diesel vehicles alike. For traditional vehicle technologies sulfur is one of the most important parameters for emission reductions especially for SO2, PM and NOx. Reducing fuel sulfur also cuts hydrocarbons and carbon monoxide from all vehicles. Emissions of ultra fine particles especially benzene, which are the focus of health concerns, are particularly sensitive to fuel sulfur content. Based on the US Auto/Oil study, it appears that NOx could go down about 3% per 100 ppm sulfur reduction. For future gasoline cars, EU Auto Oil II results show that sulfur free fuel will help ensure that significant reductions in CO2 emissions can be made without exceeding 2005 Euro 4 NOx emissions limits.

See the data collected in Table 7 below:

Table 7: Sulfur Effect on Emissions (According to World-wide Fuel charter 2002)

Study	Vehicle	Sulfur, ppm		Emissions reduction, % (From high to lows)		
		high	low	HC	CO	NOX
Air Quality 1989-1992 (AQIRP)	Tier 0	450	50	18	19	8
European Program on Emissions 1993-1995 (EPEFE)	Euro 2+	382	18	9(43*)	9(52*)	10(20*)
US Manufacturers Association 1998 (AAMA/AIAM)	Vehicle with low and super low emission (LEV & ULTRA LEV	600	30	32	55	48
Coordinating Research council (CRC)	Vehicle with low emissions (LEV)	630	30	32	46	61
Japan Auto Research Institute (JARI)	1978 regulations	197	21	55	51	77

* Reduction achieved during hot extra urban portion of test

Taking into account the health and environmental effects linked to sulfur, the new draft TCVN unleaded gasoline standard starts to reduce sulfur from 1,500ppm to 500 ppm max. It is recognised however that such a reduction does not achieve true health and environmental benefits until further reductions are implemented to lower and ultra low sulfur levels e.g. 150ppm, 50ppm and 10ppm respectively. Therefore, a second and third gasoline sulfur reduction phase is also recommended in 2008 and 2012 to come in line with the penetration of Euro 3 and Euro 4 vehicles. Refer to Annex I and II

Gasoline colour

This is one of the new requirements for gasoline in the reviewing draft. This requirement is based on decision of the trade ministry No 1273/2004 QDD. BTM which comes to in force 7 September 2004.

V. Main Automotive Diesel Specification Changes:

Best practice

The Draft TCVN Diesel standard replaces TCVN 5689:2002 setting fuel quality specifications for automotive diesel fuel, non-road diesel, and heating oil. The new draft is based on the Euro 2 standards EN590: 1993 for diesel. The main changes in comparison to TCVN 5689:2002 are detailed in table 10:

In looking at diesel fuel properties it is important to distinguish between diesel fuel used for automotive fuel purposes and diesel fuel used as non road fuel e.g. tractors, locomotives, construction equipment, boats; and as heating oil. In addition, it is important to note that marine fuel oil is also becoming regulated. In Europe and the United States, these fuel are becoming increasingly regulated separately from automotive diesel fuel. Specifications are therefore typically given for four categories of diesel fuel:

- On road automotive diesel,
- Non road or off road diesel
- Heating oil
- Marine/bunker fuel

In all four categories, efforts are being made to clean up the most polluting parameters and meet new engine requirements particularly with regard to sulfur. In fact in both the US and EU non road fuels are becoming aligned with non road fuels.

Vietnam currently has three grades of diesel including non-road diesel. In adopting its new TCVN standards, Vietnam has looked at other current diesel fuel quality developments in the region. For example in China, Thailand and Singapore as can be seen under table 8 below:

Table 8: Reference data on quality properties of Automotive Diesel Oil from other countries

Property	China to 2004/2005	Thailand (2004)	Taiwan (2002)	WWFC (class 2)
1. sulfur content, ppm, max	2000/500	350	350	300
2. Cetane number, max	45/49	47	-	53
3. Cetane index, max	–/46	47	48	50
4. Distillation at 90% v/v, °C, max	355	357	338	340
5. Flash point °C,, min	45-55	52	52	55
6. Viscosity at 40°C, cSt	2.5-8.0	1.8-4.1	1.9-4.1	2.0-4.0
7. Carbon residue 10%,m/m , max	0.3	0.05	0.1	0.3
8. Pour point, °C, max	–	10	-3	–
9. Ash content, % KL, max	0.01	0.01	0.01	0.01
10. Water and sediment, % v/v, max	–	0.05	0.05	0.02
11. Copper corrosion	–	–	–	1
12. Density at 15 °C, kg/m³	Reported/810-850 (Beijing)	810-870	reported	820-850

Cetane Index and Cetane Number

Cetane number is a measure of the compression ignition behaviour of a fuel and auto-ignition quality; it influences cold startability, emissions and combustion noise. Cetane index is a cetane

"natural" of the fuel, it can be calculated based on measured fuel properties. It can affect many different aspects of emissions. A higher number generally implies a better environmental performance. Incomplete combustion leads to white smoke emissions, especially for start-up. Dependent on the vehicle technology and the emission regulation, the world auto manufactures recommend cetane levels of around 45-50. For the Asian region the lowest cetane number is about 45, this is also the limit introduced in Vietnam's draft of Diesel Oil standard, although increasing the cetane number in future fuel quality standards is recommended so as to align the diesel fuel quality with Euro 3-4 engine needs.

Table 9: Global Diesel Cetane Numbers

2002	Cetane Number		Cetane Number
USA	40		
Canada	40	Egypt	55
Mexico	48	China	45
EU	51	India	48
S. Korea	45	Japan	50
Australia	46	WWFC	45/50/52/52

Source: International Fuel Quality Center (IFQC), 2003.

Taking into account the emissions impact linked to cetane number and index, the new draft TCVN automotive diesel oil standard increases the cetane index to 46 min. A second and third diesel oil phase is also recommended in 2008 and 2013 respectively based on the penetration of Euro 3 and Euro 4 vehicles. Refer to Annex I and II.

Sulfur content

Sulfur naturally occurs in crude oil. If the sulfur is not removed during the refining process it will contaminate vehicle fuel. It has been found that sulfur can have a significant effect on engine life. Diesel fuel sulfur also contributes significantly to fine particulate matter (PM) emissions, through the formation of sulphates both in the exhaust stream and, later in the atmosphere. Sulfur can lead to corrosion and wear in engine systems. Furthermore the efficiency of some exhaust after-treatment systems is reduced as fuel sulfur content is increased in the exhaust. In addition to its role as a technology enabler, low sulfur diesel fuel gives benefits in the form of reduced sulfur induced corrosion and slower acidification of engine lubricating oil, leading to longer maintenance intervals and lower maintenance costs. These benefits would apply to new vehicles and to the existing heavy-duty vehicle fleet beginning in 2006 when the fuel will be introduced. These benefits can offer significant cost savings to the vehicle owner without the need for purchasing any new technologies.

The current diesel oil standard defines 3 grades of diesel oil based on sulfur content. In this new draft TCVN automotive diesel oil standard only 2 grades are defined: DO 500 ppm mandatory use for vehicles to meet Euro 2 engine emission requirements and DO 2500 ppm , as follows in Table 8 below.

Taking into account the health and environmental effects linked to sulfur and the introduction of Euro 2 vehicle emission standards, the new draft TCVN diesel standard starts to reduce sulfur from 5,000ppm and 2,500ppm to 500 ppm max. It is recognised however that such a reduction does not achieve true health and environmental benefits until further reductions are implemented to lower and ultra low sulfur levels e.g. 50ppm and 10ppm respectively. Therefore, a second and third diesel sulfur reduction phase is also recommended in 2008 and 2012 to come in line with the penetration of Euro 3 and Euro 4 vehicles and PetroVietnam's production capabilities of 50ppm fuels. Refer to Annex I and II.

VI. Conclusions

Vietnam is concerned about its air quality and the impact of automotive emissions on poor air quality in its urban centers. As Vietnam is expected to continue its rapid economic growth over the coming years, the impact of road transport on air pollution is only expected to increase.

In this regard, Vietnam is following international experiences in the area of air quality, fuel quality and automotive emissions and is planning to tighten its fuel quality standards for automotive gasoline and diesel in 2005, with further tightening being discussed post 2008.

The proposed 2005 standards for gasoline and diesel (Tables 7 and 8 below) are the result of a major stakeholder process and several stakeholder meetings bringing together oil refiners such as Petro Vietnam, fuel traders, representatives of the standards body VN, and external international experts. We are therefore thankful to TAF, USAEP, VN and all of the stakeholders who actively participated in the drafting process of the standards.

Table 10: Draft TCVN 6776 : 2005 Gasoline Standard

Properties	Current standard unleaded gasoline TCVN 6776			Draft TCVN 6776 : 2005		
1. Octan number						
- RON, min - MON, min.	90 -	92 -	95 -	90 ***80***	92 ***82***	95 ***85***
2. lead, g/l, max	0,013			0,013		
3. Distillation : -Initial boiling point, °C, min -10% v/v, °C, max - 50% v/v, °C, max - 90% v/v, °C, max -Finish boiling point, °C, max - residuce, % v/v, max	Reported 70 120 190 215 2,0			Reported 70 120 190 215 2,0		
4. Copper corrosion, 50°C/3h,max	1			1		
5. existent gum, mg/100 ml, max	5			5		
6. Oxydation, min., min	240			480		
7. Sulfur, mg/kg, max	1500			***500***		
8. Vapour pressure, 37,8°C, kPa	43-80			43-75		
9. Benzene, % v/v, max	5			***2,5***		
10. Density, (at 15°C), kg/m³	Reported			reported		
11. Apperanee	Clear, no suspended matter			Clear, no suspended matter		
12. Aromatics, % v/v, max	40			40		
13. Olefins, % v/v , max	–			38		
14. Metal content (Fe, Mn, other)				Nondetectable*		
15. Oxygen, % KL, max	–			***2,7***		
16. Colour				**Red**	**Green**	**No dye**

As highlighted in table 7, the main changes to the gasoline fuel quality parameters are:

- The introduction of MON 80/82/85,
- Maintenance of lead at max 0,013 mg/kg, this limit may be reduced to 0,005 mg/kg in 2008
- Reduction of sulfur from 1,500 to 500ppm due to high sulfur impacts on health, environment and Euro 2/3 engine technologies
- Reduction in benzene from 5 to 2.5 % v/v, max as benzene is a class 1 carcinogen and very harmful to human health and the environment
- RVP has been slightly reduced from 80Kpa to 75kPa at the top end but this may need to be re-addressed in 2008 or later due to the increase in volatile emissions related to greater than 60kPa in warm climates
- Olefins have been set at 38% v/v

Table 11: Current and draft of standard TCVN 5689 Diesel Oil (DO)

Properties	TCVN 5689 : 2002			Draft TCVN 5689:2005
	DO 0,05 %	DO 0,25 %	DO 0,5 % S	
1. Cetane index, min	45	45	45	46
2. Sulfur, mg/kg, max	500	2500	5000	**500**
3. Distillation, ^{O}C, 90% v/v, max	370	370	370	360
4. Flash point, ^{O}C, min	50	50	50	55
5. Viscosity, 40^{O}C, cSt (mm^2/s)	1,6-5,5	1,6-5,5	1,6-5,5	**2-4,5**
6. Carbon residue, 10% distilled volume,% m/m, max	0,3	0,3	0,3	0,3
7. Pour point, ^{o}C, max	+ 9	+ 9	+ 9	+6
8. Ash, % m/m, max	0,01	0,01	0,01	0,01
9. water, % v/v, max	0,05	0,05	0,05	0,02
10. particulates, mg/l, max				**10**
11. Copper corrosion, 50^{O}C, 3 h, max	1	1	1	1
12. Density, 15 ^{o}C, kg/m^3	report	report	report	820-860
13. Lubricity, μm, max				**460**
14. Appearance				**Clear, bright**

As highlighted in table 8, the main changes to the automotive diesel fuel quality parameters are:

- Reduction of sulfur from 5,000 and 2,500 to 500ppm due to high sulfur impacts on health, environment and Euro 2 engine technologies penetrating the Vietnamese market

- Increase in the Cetane index from 45 to 46
- Reduction in the Distillation, ^{O}C, 90% v/v, max from 370 to 360
- Increase in flash point ^{O}C, min from 50 to 55
- Increase in Viscosity, 40^{O}C, cSt (mm^2/s) from 1,6-5,5 to 2-4,5
- Reduction in Pour point, ^{o}C, max from +9 to +6
- Reduction in water % v/v, max content from 0,05 to 0,02
- Insertion of fixed Density, 15 ^{o}C, kg/m^3 of 820-860
- Insertion of new parameters for particulates, mg/l, max value of 10, Lubricity, μm, max of 460, and appearance "clear, bright"

Vietnam has chosen to adopt the above fuel quality specifications for gasoline and diesel which are similar to Euro 2 "type" (the gasoline specifications are not exactly the same as Euro 2 fuels and in some cases do go towards Euro 3 fuels e.g. benzene, aromatics) fuels EN 228 and 590 – 1993, so as to match developments in the region e.g. china, Thailand, Singapore, Taiwan, and move towards cleaner fuels. Note: Euro 2 type fuels are not qualified as environmental fuels, as the only environmental parameter, which is strengthened is sulfur and the reduction in sulfur to 500ppm is not qualified as enough to have major environmental and health benefits. Therefore, these new standards are being implemented along with new Euro 2 vehicle emission requirements, and are only considered as the first step in a more comprehensive fuel quality and vehicle emissions strategy to be adopted in 2008 and in 2012.

Proposed future fuel quality changes will be laid out in a road-map identifying further changes in 2008 and 2012 (refer to Annex I and II) so as to allow the oil industry, traders and the automotive industry the necessary lead time to prepare themselves. Vietnam believes that it is necessary to further tighten its fuel quality standards, so that all fuel imports into Vietnam will be cleaner, and domestic production to come on line in 2008 matches international and regional clean fuel trends. As seen in this fuel quality overview, Asian countries except for Japan are behind Europe in the introduction of the Euro 3 and 4 type fuels, but most countries, plan to adopt similar standards around the 2010 timeframe. In this regard Vietnam will do the same, in order to reduce the growing impact of air pollution from transport on health and the environment. Vietnam is determined to move away from the consumption of less environmentally friendly fuels and not become Asia's dumping ground for high sulfur fuels still produced in the region. Due to the start up of the two new Petro Vietnam refineries it is recommended that a cost effective approach be undertaken immediately in the planning of low sulfur fuel production and thus Vietnam should leapfrog if possible from 500ppm max fuels to 50ppm fuels in line with Petro Vietnam's clean fuel production plans in 2008. This will incentivize Petro Vietnam and create a market advantage for domestic fuel over imports thus giving Petro Vietnam a swifter payback period for its initial investment in clean fuel production technologies.

In order to ensure stakeholder cooperation and acceptance of Vietnam's future fuel quality and vehicle emissions strategy and road map, the Vietnamese government and standards association VN will organize stakeholder meetings over the coming months. It is recommended that in addition to the fuel quality changes proposed, stakeholders discuss with the Government the necessity of a communications campaign on the new fuels so that the Vietnamese people are aware of the benefits and support the change (refer to Philippines Case Study 3 in Annex III), and the possibility of tax incentives use. The Vietnamese Government should address whether tax incentives may need to be envisaged in the second phase of the project e.g. 2008 in order to facilitate the implementation of these changes. Tax incentives have been successfully used in Europe to differentiate between cleaner fuels and other fuel qualities. This has assisted oil companies in the investment of cleaner fuel technologies and has facilitated the introduction of cleaner fuels on national markets by making the pump price lower for the consumer. This could be a useful tool for Vietnam in order to differentiate between 50ppm quality fuels and higher sulfur fuels and would also help PetroVietnam regain some of its investment in cleaner fuel technologies.

ANNEX I:
PROPOSED UNLEADED GASOLINE REQUIREMENTS:
MAIN ENVIRONMENTAL PARAMETERS 2005, 2008 & 2012

	Unleaded Gasoline	Gasoline	
	2005 (July)	2008	2012
	Euro 2	Euro 3/Euro 4	Euro 4
RON, min	91/95/98	91/95/98	91/95/98
MON, min	82/85/88	82/85/88	82/85/88
RVP @37.8° kPA , max	43-75	43-70 (s)	43-70 (s)
Lead g/l, max	0.013	0.005	0.005
Aomatics vol%, max	40	40	35
Benzene vol%, max	2.5	1	1
Olefins vol%, max	35	18	18
Oxygen wt%, max	2.7%	2.7%	2.7%
Sulfur ppm, max	500	150 (50)*	50(10)

*Footnote *: The 2008 Period is seen as a transitory period to 2010. This is predominantly for imported fuel quality not domestically produced fuel. Due to the new technological investments made at the two PetroVietnam refineries around the 2008 period, it is recommended that the refineries directly invest in technology allowing them to produce 50ppm sulfur fuels and leapfrog directly to Euro 4 standards. This makes more economic sense.*

ANNEX II: PROPOSED AUTOMOTIVE DIESEL REQUIREMENTS:

MAIN ENVIRONMENTAL PARAMETERS 2005, 2008 & 2012

Diesel			
	2005 (July)	2008	2012
	Euro 2	Euro 3/4	Euro 4
Cetane #	49	51	51
Cetane Index	46	46	46
Density @ 15° C, kg/m3, min-max	820-860	820-845	820-845
Viscosity @ 37.8° C, csT, min-max	2.0-4.5	2.0-4.5	2.0-4.5
Distillation T90° C, min-max	350	350	350
PAH, wt% max	-	11	11
Sulfur ppm, max	500	350(50)*	50(10)

Footnote *: The 2008 Period is seen as a transitory period to 2010. This is predominantly for imported fuel quality not domestically produced fuel. Due to the new technological investments made at the two PetroVietnam refineries around the 2008 period, it is recommended that the refineries directly invest in technology allowing them to produce 50ppm sulfur fuels and leapfrog directly to Euro 4 standards. This makes more economic sense.

ANNEX III: ASIAN BEST PRACTICE CASE STUDIES

Case Study 1: Japan - JCAP I and II

Background - The Japan Clean Air Program (JCAP) is a collaborative study undertaken by the automobile and the petroleum industries in Japan - similar to other countries, such as the current Auto Oil Program in the US and CAFÉ in Europe to develop automobile and fuel technologies to improve air quality. The first stage of the program, referred to as JCAP I, was carried out from 1997 to 2001.

Japan implements one of the most stringent automotive emission regulations in the world, further decrease in automotive emissions is required to achieve better air quality and environment. The U.S. and Europe, having similar problems to Japan, are carrying out air quality improvement programs by combining automotive and fuel technologies: the Air Quality Improvement Research in the U.S., and the Auto Oil Program (AOP) in Europe. To develop a similar program, suited to the specific Japanese context, the Petroleum Energy Center, in collaboration with automobile and oil industries in Japan, launched the Japan Clean Air program (JCAP) to estimate the future atmospheric environment and to investigate the most cost-effective combination of measures for the improvement of its air quality based on an analysis of the nation's unique social, industrial, geographical, and meteorological conditions.

Under a subsidy from the Ministry of Economy, Trade and Industry (METI), the Japan Petroleum Energy Center (JPEC) had the lead responsibility for JCAP. Since its inception in 1997, it has had the close cooperation of the Petroleum Association of Japan (PAJ) and the Japan Automobile Manufacturers Association (JAMA). JCAP I was a five-year effort running from 1997 to 2002.

Issue Focus - The objectives of JCAP I were:

(1) To evaluate the potential for improvements or modifications of fuel quality to reduce emissions, and
(2) To clarify the role of more advanced technologies for medium and longer-term emissions reductions.

The principal conclusions from JCAP I were as follows:

The sulfur content in gasoline had a great impact on emissions
The Reid Vapour Pressure of Gasoline had a great impact on evaporative emissions
Diesel fuel sulfur content had a great impact on exhaust emissions, and
Diesel Particulate Filters retrofitted to active use vehicles could not display sufficient capacity under urban driving conditions.

The results of JCAP I research were presented at the 3rd JCAP conference held on February 21-22, 2002 in Tokyo. The first program was able to create mutual understanding between the automobile and petroleum industries, release reliable data to the public, increase the number of technical opinions for making air quality policies, and discuss comprehensively on air quality improvement, energy and economical issues.

The second stage, JCAP II, has further been carried out starting 2002 and is expected to be completed by 2006. The objectives of JCAP II are divided into two studies:

1. Automobile and Fuel Technology Study

- Evaluate high technology for gasoline/diesel vehicles aiming at near zero emissions and fuel properties;
- Evaluate emissions and CO2 reduction potential;
- Examine fine particle measurement methods and evaluate high technology through high measurement methods.

2. Air Quality Model Study

- Build a real-world emission inventory simulation model;
- Build an integrated model of both urban and roadside air quality;
- Evaluate the integrated air quality model and case study.

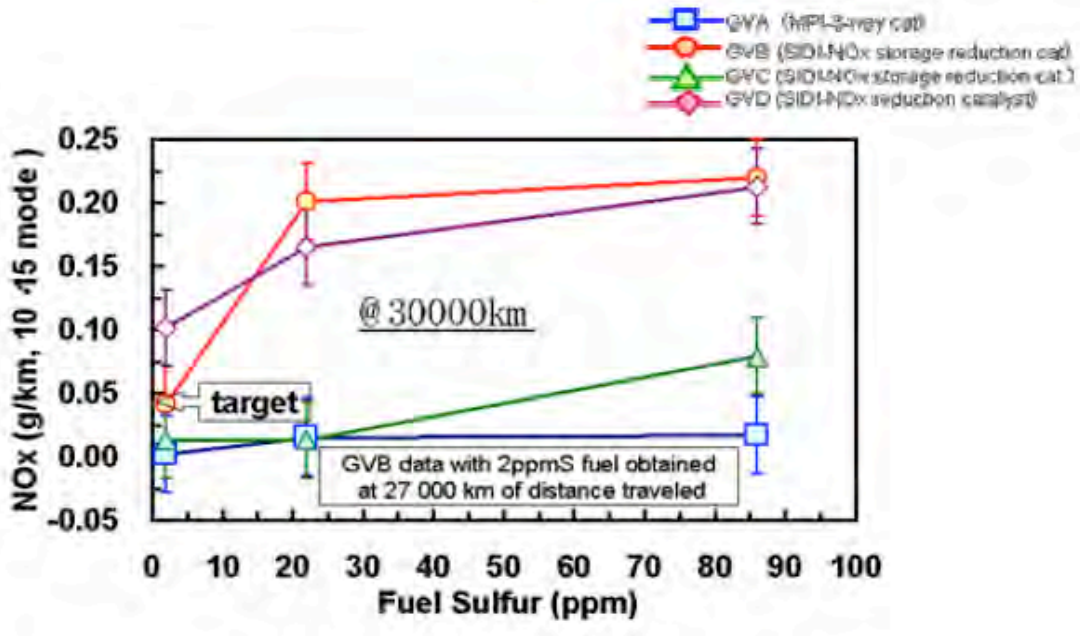
There are seven working groups (WG) under JCAP II, with the Gasoline WG studying the influence of fuel properties such as sulfur and RON on automobile emissions and fuel consumption, and the Diesel WG studying CO2 emission reduction potential with high diesel technologies and ideal fuels. The other WGs include Oil, Unregulated Material, Health Effects, CO2 Emission, and Air Quality Model.

The following is a summary of some of the JCAP II results relating to the effects of sulfur in gasoline and diesel on nitrogen oxide (NOX) emissions and fuel efficiency as well as particulate matter (PM) emissions. These results were recently presented at the 3rd Asian Petroleum Technology Symposium in Kuala Lumpur, Malaysia from March 2-4, 2005.

Effects of gasoline sulfur levels on NOX emissions:

The effects of sulfur on NOx emissions from Spark Ignition Direct Injection (SIDI) vehicles at 30,000 km of distance traveled can be seen in Figure 1 below. At near zero sulfur levels, NOx emissions are clearly lower for GVB, GVC and GVD vehicles than at sulfur levels around 20 ppm or 85 ppm. Similarly, also the World Wide Fuel Charter (WWFC) suggests the importance of very low sulfur levels for advanced technology vehicles; sulfur free gasoline is found necessary by the engine manufacturers to maximize the benefits of lean-burn, fuel efficient technology.

Figure 1. Sulfur Effect on NO_x Emissions



Source: Japan Petroleum Energy Center, March 2005

Effects of gasoline and diesel sulfur levels on fuel economy:

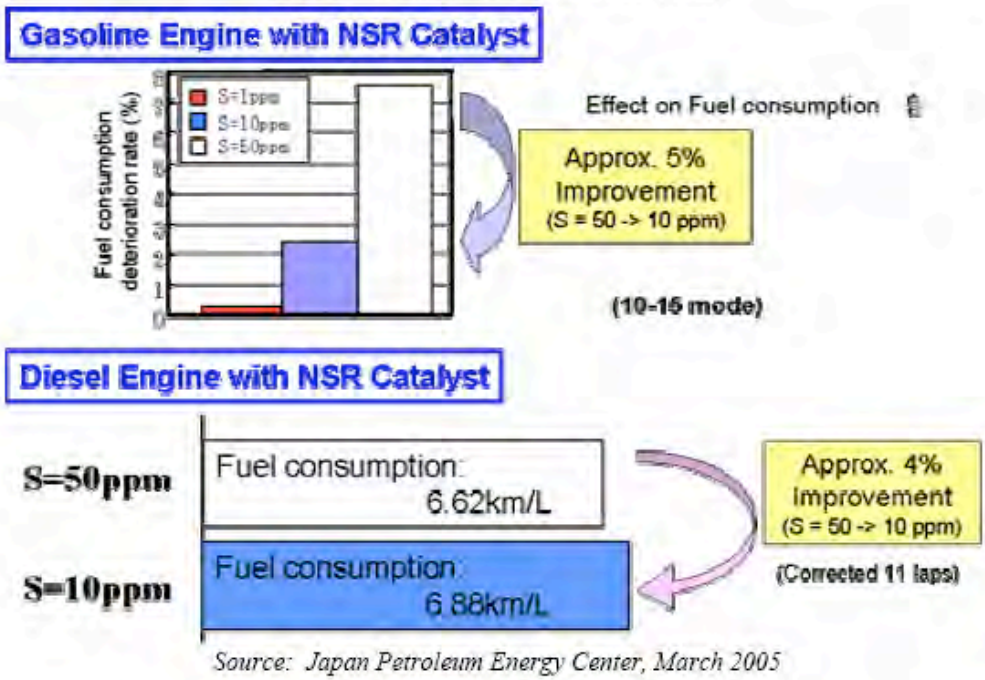
Figure 2 below shows the effects of sulfur on fuel economy in both gasoline and diesel engines fitted with NOx sulfur reduction (NSR) catalysts. The tests show that there is a 5% improvement in fuel consumption when 10 ppm sulfur gasoline is used compared to 50 ppm sulfur gasoline. Using the same scenario for diesel engines, fuel consumption is found to improve from 6.62 km/l to 6.88 km/l or about 4%.

According to the WWFC, it was predicted in the European Auto Oil program that a sulfur reduction from 500 ppm to 30 ppm in trucks will result in PM emission reductions of 7% from light duty diesel vehicles and 4% from heavy duty diesel trucks. A correction factor was later developed to take into account the absolute PM level or the fuel consumption to better reflect the relationship between PM and fuel sulfur levels. Effectively, the correction suggests that the real benefit from sulfur reductions will be even more significant. As a result, the Committee on Motor Vehicle Exhaust Emission, Petroleum Products Quality Sub-committee of Advisory Committee for Natural Resources and Energy and the Evaluation Committee of Diesel Vehicle Emission Control Technologies got together for a meeting and reflected the following air quality improvements in environment and energy policies:

- Mandate of 50 ppm sulfur fuels starting 2005 and 10 ppm sulfur gasoline and diesel from 2008 and 2007 respectively to reduce sulfur emissions
- Self-imposed control of RVP in gasoline due to significant evaporative emissions;
- Preparation of diesel vehicle emission regulations by the Tokyo Metropolitan Government due to inadequate retrofitting of DPF to in-use vehicles under urban driving conditions.

Generally, JCAP II is expected to continue co-operation between the automobile and petroleum industries, generate discussion with citizens and other industries, and release reliable data based on innovative technologies and air quality models. Evaluation of health effects in the real world and proposal of a socially optimal system using advanced automobile and fuel technologies are also expected to be carried out. The progress of JCAP II will be presented at the 4th JCAP conference to be held on June 1-2, 2005 in Tokyo (visit http://www.pecj.or.jp/japanese/index_j.html for more information).

Figure 2. Sulfur Effect on Fuel Economy



Source: Japan Petroleum Energy Center, March 2005

Analysis / Lessons Learned - JCAP I highlighted the important role that fuels can and will play as a central component of efforts to reduce motor vehicle pollution. Most important has been the focus on the role of sulfur in both gasoline and diesel fuel and as a result of this effort, aggressive efforts have been taken to introduce near zero sulfur (10 ppm) fuels in Japan. The JCAP program has also demonstrated the value of bringing vehicle manufacturers and oil industry together in one program to arrive at effective strategies for emission reduction control.

JCAP II will broaden the scope to focus on near zero emitting technologies as well as high fuel economy or low CO2 emissions. The benefits of low RVP fuels were also highlighted.

Source: ADB, 2003 and IFQC, 2005

Case Study 2: Malaysian Air Quality and Clear Fuels Initiatives

Background - The air quality problems faced by the government of Malaysia appear to be moderate. The main area of air pollution concern is the Klang Valley. The air quality data indicate that there are a significant number of days in the Valley when ozone concentrations are above the health standards and a number of days when the ambient PM10 concentrations are above health levels. The meteorological conditions, and the high concentration of mobile and other pollution sources in the Valley create conditions that are conducive to higher pollutant levels. It appears that the fuels and motor vehicles are the major contributing sources to pollution in the Valley.

Since there is a significant growth in motor vehicle population, the emissions from motor vehicles will continue to increase. Consequently air quality problems will become progressively worse unless measures are taken.

Issue Focus - The government of Malaysia is in the process of taking a preventive approach against air pollution through a series of measures. Among other actions:

Malaysia has established a governmental cooperation with GtZ. GtZ is providing the government of Malaysia with expert technical assistance on a number of areas where there is a lack of expertise. The assistance provided by GtZ to the government of Malaysia is critical in their efforts to implement an air quality strategy.
Malaysia is in the process of restructuring the environmental agency in order to allocate more resources and assign higher priority on air quality issues.
Malaysia has been expanding the air quality monitoring- network, and has been collecting an emissions inventory for both stationary and mobile sources in order to identify the contribution of various sources to the air quality problem.
Fuels and motor vehicles standards are an important component of the Malaysian strategy. The government of Malaysia has been evaluating the options of implementing standards for fuels and motor vehicles as a preventive means to emissions' reductions.

Table Comparison of Malaysian Gasoline Properties to CA, USEPA, EU, Thailand, MVMA:

Fuel Property	*Malaysia*	*Thailand*	*CA*	*USEPA*	*EU*	*MVMA*
RVP, psi	*10.0*	*9.0*	*7.0*	*7.2*	*7.0*	*Varies*
S, ppm	*1500*	*300*	*20*	*130*	*50*	*30, 200, 1000*
Aro. vol%	*40-45*	*35*	*25*	*25*	*35*	*35,40,50*
Benz.vol%	*3-5*	*3*	*0.8*	*1.0*	*1.0*	*1.0,2.5,5.0*
Ole. vol%	*18*	*18*	*6.0*	*8.5*	*18*	*10.0,20.0,-*
Ox. wt%	*---*	*0.4*	*2.0*	*2.0*	*---*	*2.7,2.7,2.7*
T90,deg F	*356*	*---*	*305*	*320*	*290*	*----**
	239	*---*	*213*	*210*	*200*	*----**

Currently the Malaysian government has established a dialogue with the oil industry, and it is considering the implementation of Euro 2, Euro 3, and Euro 4 fuel standards. Three potential approaches are being considered:

Approach A: Implementation of Euro 2, Euro 3, Euro 4 standards consecutively over a period of 10 years.

Approach B: Implementation of Euro 2 standards within a short time interval to be followed by Euro 4 implementation in a 4-6 years time frame.

Approach C: Implementation of Euro 2 and Euro 3 standards within a 4-6 years time frame. Evaluation of the air quality to determine the need for implementation of Euro 4 on a later date.

Analysis/Lessons Learned - The ability to recover the costs of compliance is a critical issue. Even when the air quality has not reached a critical stage, it is prudent to implement a fuels program as a preventive measure and to meet the needs of motor vehicles. Resources as well as infrastructure are needed in order to implement a fuels program A fuels program requires the cooperation of a number of governmental agencies.

Source: ADB, 2003Case study 3: Phase out of Leaded Gasoline in the Philippines

Background - When the Clean Air Act of the Philippines was signed into law in 1999, lead phase-out was identified as the first priority action because of its serious health effects. This prioritization was widely supported by civil society groups throughout the development and public consultations on the law. The Act mandated the elimination of leaded gasoline by January 1, 2001, but the major oil companies and the Department of Energy decided to advance the phase-out to April 1, 2000 in Metro Manila. The announcement of the early phase-out plans prompted a multi-sectoral group including government, business, civil society, and development institutions interested in the implementation of the Clean Air Act to meet. These stakeholders agreed and decide that the success of the phase out was hinged on public understanding and acceptance.
In February 2000, an ADB-US AEP (The United States-Asia Environmental Partnership) supported workshop with over 150 participants from government, non-government organizations (NGOs), civil society, and the private sector was conducted to educate these stakeholders about the issues involved in the phase-out of lead and to enlist the participants in planning and executing a campaign to educate the public about the phase-out. Participation was high because of the high profile and effective speakers and the momentum generated by the accelerated deadline for the Metro Manila phase-out. The workshop participants agreed to form the Lead-Free Coalition and launch a public awareness campaign with the following objectives:

Inform motorists that the lead phase-out will occur on April 1
Reassure motorists that their vehicle can safely use unleaded gasoline
Underscore the physical/health benefits
Explain the financial benefits from the use of unleaded gasoline

Issue Focus - The Lead-Free Coalition made effective use of a wide range of media and convinced the oil companies to include educational information in their print ads. The short time available and the small budget required the group to be creative and focused. The main challenge was the very short time frame to develop and implement the campaigns before phase-out dates. The group addressed this by quickly pulling together the right partners and implementing an intensive campaign that lasted for three weeks and included seminars/press media publicity, TV and radio spots, print ads, and distribution of flyers, stickers, and posters. Non-traditional media were also used, e.g., telephone hotlines, website, mailing inserts, and seminars. Some resistance was encountered from vehicle manufacturers and motorized tricycle operators. The opposition included concerns about the technical ability of all cars and motorcycles to safely switch to unleaded gas, and the higher cost of unleaded versus regular,

low-octane gas. The federation of tricycle operators and drivers filed a temporary restraining order to stop the phase-out; however, the Coalition initiated an outreach effort and convinced the federation to drop the case. In Metro Manila, the decision-making process took place in several meetings with key partners before and after the February workshop, in which a large number of people from all concerned sectors were present and encouraged to give their opinion and get involved in the campaign. During the meetings, policy issues were discussed in an open, multi-sectoral forum that led to greater understanding and faster action.

After the Metro Manila phase-out, the focus was on the nation-wide phase-out scheduled for January 1, 2001. At this time the Coalition expanded its campaign to include cleaner diesel and renamed itself the Coalition for Cleaner Fuels. Nine regional dialogues were held to raise awareness, answer questions, and put fears at ease in regions across the country—environmental NGOs, the transport industry, and the agricultural and fishing communities were particularly involved at the regional level. This network of local contacts was used for materials dissemination, feedback, and, later, compliance monitoring. The group achieved its objective of a smooth phase-out of leaded gasoline. The group (now called the Partnership for Clean Air) reports on its performance during the yearly General Assembly and has set up an external evaluation committee to evaluate the group' s work twice a year.

Analysis / Lessons Learned – The lead phase-out campaign in Metro Manila and the provincial dialogues and campaigning were deemed successful because the lead phase-out took place without any major resistance. This was an important accomplishment given the poor image of oil companies and government (protests are regularly held when fuel prices are raised), short time and budget available. Because the passage of the Clean Air Act was very contentious, it was critical for the first action of the Act, which was the leaded gasoline phase-out, to be carried out in an inclusive manner with a great deal of two-way communication. The Coalition's efforts accomplished this. The Coalition also included cleaner diesel in its provincial campaign, ahead of the December 21, 2000 reduction of sulfur to 2 mg/litre. Eliminating lead from the air and reducing sulfur levels will have major impacts on the health of the population, especially the urban poor, and ecosystems. This effort also resulted in a sustainable, effective group that has evolved into the Partnership for Clean Air.

The group learned (and demonstrated) the value of multi-sectoral cooperation and strong partnerships to accomplishing a goal that involves many stakeholders. There were many naysayers and roadblocks during the initial meetings, and it was difficult to coordinate everyone's schedules and convince people who normally are at odds (NGOs vs. industry and one government department vs. another department) to work together on a common goal. But the momentum created by the February 2000 workshop and the success of the campaign convinced the group to continue working on other air pollution issues and to build on the foundation of the strong partnerships that were forged. The highly visible and important role played by the NGOs throughout the phase-out initiative was also recognized. The president of the lead NGO, Concerned Citizens Against Pollution, was a very credible and convincing spokesperson on many TV and radio talk shows and in meetings with oil company executives and top government officials.

Source: ADB, 2003

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SUSTAINABLE MANAGEMENT OF RIVER FLOWS AND WATER EXTRACTIONS IN VIET NAM:

A REVIEW OF INTERNATIONAL APPROACHES TO DETERMINING APPROPRIATE MANAGEMENT RULES.

REPORT 1

January 2005
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It was prepared by Bruce Fitzgerald for the United States - Asia Environmental Partnership.

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REPORT 1

Contents of Report

1. Purpose of this report

Like most developing countries in Asia and elsewhere, the Government of Viet Nam has been driven by the need for rapid economic development and urbanisation aimed at improving the quality of life for its people and at poverty reduction. This requires the development of major new water supply systems and increases in the use of water for a wide range of purposes.

Unfortunately, there has been little consideration of the impacts of changes in flow regimes and extraction of water on natural river or aquifer processes with the result that river health suffers and aquifer levels decline. Not only does this affect the environment but it also has consequences for the use of the river for a variety of basic human use purposes (household water supply, fishing etc) and for the long-term viability of economic development.

The potential impacts of water use development on the long-term health of water sources is recognised, at least in a general policy sense, by the government in Viet Nam. Unfortunately there are no established procedures or methodologies in Viet Nam for determining appropriate management rules or for providing consistent and useful information to those making development and water use decisions about potential impacts and how to mitigate them. It is also evident that there is no widespread appreciation of the links between disruption of flow regimes and extraction of water and declines in water quality, and production of fish and other valuable natural products and services which rivers provide.

Viet Nam is soon to embark on a river basin planning process. It is important that procedures and methodologies are developed and adopted before this process gets underway. Without them there will be inadequate consideration of potential long-term damage to water sources and the consequent economic and social costs to the country and future generations. Decisions will continue to be based on more readily perceived immediate economic development benefits.

Considerable effort has been made in many countries to develop procedures and methodologies. Those that have been developed range from very simple single focus methods to quite complex frameworks which encompass social and economic considerations as well as potential impacts on long-term water source health and productivity.

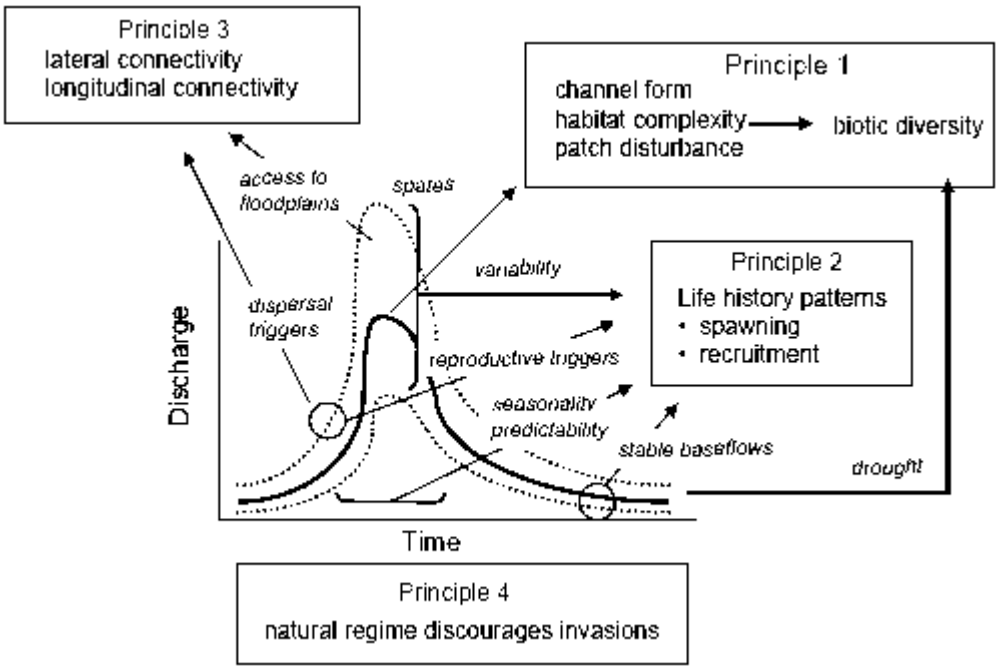
The purpose of this first report is to assess existing international methodologies and see whether any could be appropriate for adoption in Viet Nam. This first report will be followed by two further reports. The second report will assess the short listed approaches in more detail and then propose a methodology for adoption in Viet Nam. The final report will refer to the considerations and conclusions of this report, and those of the second report but do so in as concise and readily digestible fashion as possible.

The process for developing a methodology for Viet Nam will also include two workshops and an overseas study tour. The first workshop will occur before preparation of the second report. It will be aimed at disseminating information about overseas practices and reaching agreement on the most appropriate models to examine as part of the study tour. The second workshop will occur after the study tour and before finalisation of the final report. It will be aimed at informing decision makers and other relevant parties about the proposed methodology for Viet Nam and will seek their comments for incorporation into the final report.

2. Surface Water Background

2.1 THE CONNECTION BETWEEN WATER USE DEVELOPMENT, RIVER FLOWS AND RIVER HEALTH

The following diagram, (Bunn and Arthington 2002) shows some of the connections between a river's natural flow regime and the resulting plant and animal responses and geomorphic processes.



The 'principles' which the diagram refers to are that:

1. major flow events drive geomorphic processes, determine the form of habitat available for plants and animals and therefore set limits to those that can continue to exist in a river system,
2. the plants and animals associated with a river have evolved responses that match the opportunities and pressures provided by the natural flow
3. many animal species in rivers, and plant and animal species adjacent to rivers, require the periodic connections that occur during floods if they are to survive, disperse and prosper, and
4. that changes to the flow regime reducing the competitive advantage of endemic species and encourage colonisation by exotic and introduced species – and possibly also dominance of a sub set of the existing range of species.

As the diagram shows, these links exist at all flow levels and at all temporal scales. Because of this any change to the natural flow regime as a result of dam construction and regulation of river flows or extraction of water will have some impact on plant and animal responses and/or river processes.

Generally changes to the flow regime will have negative effects on the numbers of naturally occurring plants and animals and, if the changes are excessive, may even result in their total loss from a river. This is because the flow changes disrupt breeding cycles, contribute to

reduced water quality, lead to loss of habitat and may favour introduced species of plants and animals. They will also often produce adverse geomorphic impacts which add further to impacts on plants and animal numbers and established community uses of the river.

Dams are constructed on rivers to allow "time shifting" of the flow of water from the catchment upstream of the dam into the river downstream of the dam. This results in a flow regime downstream of the dam which, when compared to the natural flow regime, will generally show changes in:

- short term variability – flows may be more or less variable;
- seasonality – flows may be moved from a wet time of the year to a dry time,
- inter-year variability – with flows moved from years of high flow to years of low flow

The purpose for which water is used in a regulated river system is also important with respect to impacts on the scale and timing of impact on flows. With respect to their general effect on the flow regime the purposes can be placed in the following general usage categories:

- agricultural,
- riparian household supply/ urban supply
- hydro-electricity.

Agricultural water demands are seasonally variable and inversely related to rainfall. Therefore the total taken may vary substantially from year to year even though there has been no change in the underlying average demand. Riparian household and urban supply demands are relatively constant throughout the year and are relatively little affected by year to year or even seasonal variations in climate. Hydro-electric demands vary with demand for power. This is generally not significantly related to rainfall or to time of the year. However, great variations in releases may occur over very short time frames in response to changes in demand for power during a day, and in particular from peak to off peak periods of the day.

In an unregulated river the only impact on the flow regime comes from the extraction of water. Because there is no "time shifting" of inflows, the only effect that can occur is a loss of flow volume. Because the diversion capacity of extraction works is generally small relative to floods and even "normal" flows, and because agricultural extractions are generally higher during times of low rainfall, the loss of flows is generally most pronounced during low flow times. The relative effect of extractions at such times may however be quite large and persist for long periods. As a result, the consequences to river health can be serious.

What is "river health"?

"River health" has been given a variety of definitions in the scientific literature and there are a number of indices being used in various countries to assess the health of rivers. Often these definitions and indices use a river's natural state as the condition that defines good river health. Such a definition is however not reasonable in Viet Nam where the preservation of "natural" conditions is generally a much less realistic goal here than in many western countries, particularly as many river systems and their ecosystems have been affected by human uses for a very long period.

Therefore, for the purposes of this report, river health is assumed to refer to a river's ability to maintain key physical, chemical and ecological processes and a community of organisms with a desired species composition, diversity, and population despite any natural or man made disturbances that can be reasonably expected. The processes and organisms that indicate good health may be those that were there naturally or may be some altered assemblage that the community accepts as reasonable in the light of the long-term benefits it wishes to derive from the river. Any change from "natural" that is used to define good health should not however be one which substantially or unjustifiably limits future generations choices in relation to use of the river.

2.2 RIVER FLOWS AND WATER USE IMPACTS IN VIET NAM

2.2.1 Flow distribution and the impacts of current water exploitation.

A simple comparison of the total flows in Viet Nam's rivers with water extractions would lead to the conclusion that there should currently be minimal conflict between development and water extractions and maintenance of river health. The total average annual volume of flow in rivers entering the sea along Viet Nam's coast is approximately 835 billion cubic metres. Water use however is only around 90 billion cubic metres per annum, of just 11% of the total average outflow. A simple comparison of average flow with usage is however likely to be misleading, because much of the flow of any river comes during flood times, and is not really available at a times when most water use occurs. However, even taking this into account, as the World Meteorological Organisation (WMO 1997) has done in their water stress index (see table 1 below), this simple comparison would seem to indicate there should not currently be too great a problem.

TABLE 1 –WATER SCARCITY INDEX
World Meteorological Organisation

Water stress is defined as a country's estimated volume of water used per annum expressed as a percentage of the estimated available water resource. Four levels of stress are identified:

(1) Low water stress —Where less than 10 per cent of their available water resource is used there is generally little pressures on water resources.

(2) Moderate water stress — Where the use of water is estimated to be in the range 10 to 20 per cent of the available resource, water is becoming a factor which is limiting development. Efforts are needed to reduce demand and investments are required to increase supplies.

(3) Medium to high water stress — Here water use is in the range of 20 to 40 per cent and careful management is needed to ensure that uses remain sustainable. Competition between different human uses has to be resolved and attention given to ensure that there are flows adequate for aquatic ecosystems.

(4) High water stress — Use of more than 40 per cent of the available resource indicates a position of scarcity and often the use of water at a rate faster than the natural replenishment. Alternative sources such as desalination have to be developed, and urgent attention must be given to the intensive management of the resource and the demands made on it. Present patterns of use are not likely to be sustainable and scarcity of water is becoming a limiting factor to economic growth.

This simple indicator is however misleading when applied to Viet Nam for four main reasons.

The first is the uneven geographic spread of Viet Nam's surface water. Around 60% of the total volume comes via the Mekong (Cuu Long). However, the Mekong delta region of Viet Nam makes up just 12% of the country and accounts for only and 20% of the population and about 30% of water use. If the country is examined on a regional basis, then the figures are much less comforting. In the region with the highest proportional water use, the coastal area between Da Nang and Nha Trang, 35% of total flows are being consumed. In the

region between Thanh Hoa and Hue water use is 23% of total flow (World Bank 2003). Therefore, over approximately 25% of the country, water use is already occurring at a rate that the WMO would consider unsustainable without careful management. The uneven spread of water resources is also apparent from water per capita figures. In the Mekong delta there is 28,000 cubic metres of water on average per person, however in the Dong Nai Basin there is just 3000 cubic metres per person.

The second reason is the uneven spread of runoff over the year. Typically, the average runoff in the driest 6 months, the time of highest water demand, is only between 15% and 30% of total annual runoff. Of the 9 major river basins in the country 6 frequently have major water shortage problems during the dry season (ONWRC 2003). This clearly indicates that a very high proportion of flows is being taken from many of Viet Nam's rivers at low flow times. The ONWRC report goes on to say that in many areas the total dry season demand is already frequently higher than the available supply. This situation will only worsen with time. The report estimated that by 2010 dry season demands will have increased from 70.7 x 109 cubic metres to 90.2 x 109 cubic metres.

The third reason is that the flows in many Viet Nam's rivers are also disrupted by storage and release of water for hydro-electric power. Hydro power accounts for 55% of the country's total power production capacity (World Bank 2003)

The fourth reason is that water development and water use in upstream countries is also affecting the two main rivers which flow through Viet Nam, the Mekong and the Red River (Song Hong).

If these factors are taken into account it is clear that water exploitation in many of Viet Nam's rivers is already at levels that experience in other countries demonstrates will contribute significantly to water quality problems, declines in natural aquatic food stocks and other river health effects.

2.2.2 Future water exploitation

The medium term projections for water use growth indicate that the current situation with respect to conflict between exploitation and river health will worsen significantly unless great care is taken. Agricultural water demands currently account for about 85% of total water use. These are projected to grow at about 4% per annum until 2010 (ONWRC 2003). Hydroelectricity production growth and associated dam construction will also have to continue at a rapid rate to allow the country to provide for the projected 10% per annum growth in power demands.

There are already approximately 500 "significant" reservoirs in Vietnam (over 1 million cubic metres or 10 metres in height), and 6 storages of more than 1000 million cubic metres (World Bank 2003). The catchment area of the 19 largest storages total about 12% of the total area of the country. There are many major new dams proposed to service hydro-electric and water supply requirements.

2.2.3 Management of dams

Many dams in Viet Nam are used for a variety of purposes, and operational priorities may switch depending on the time of year. For example, priorities in some dams switch from hydro-electricity production to flood control in the wet season. Hydro-electricity production involves storage of large inflows which are them released at rates compatible with power station capacities and power demands over long periods. flood control involves holding of water during times of flood and subsequent high rate releases of water to evacuate storages and restore airspace capacity as soon as inflows downstream of the dam

drop below flood rates. Rules for operation of storages and switching of operational priorities are not fixed. Committees may alter release arrangements to satisfy changing priorities for electricity production or water for agriculture or other purposes. This adds uncertainty to the assessment of long-term impacts of dams on the downstream flow regime.

CONCLUSIONS - RIVER FLOWS AND WATER USE IMPACTS

- The degree to which dams, river regulation and water extractions affect flows in river systems in Viet Nam varies greatly between river systems.
- In a large proportion of the country water use and other flow regime changes are already at levels which are generally acknowledged to cause significant declines in river health without careful management.
- In many rivers a large proportion of river flows are regularly being extracted for use during the dry season.
- The scale and rapidity of new storage construction, the importance of hydro-electricity and the rate at which water extractions are growing makes it urgent that policies and assessment processes which properly consider the flows needed to maintain river health be determined and implemented as soon as possible.
- The multi-purpose nature of some dams, the lack of fixed operational rules and the likelihood that management may change over time makes the assessment of long-term impact of some dams difficult to determine. This may make it necessary to periodically review rules designed to provide flows needed to maintain river health.

3. Groundwater background

The exploitable yield of groundwater systems across the entire country has been quoted as being up to some 60 billion cubic metres per year (World Bank 2003, ONWRC 2003). However, it appears this figure is based on some very simple assumptions about country-wide recharge rates and geology. Calculations for areas where groundwater exploitation is of interest and there is some monitoring and geological information available indicate potential yields of around 6 to 7 billion cubic metres per annum. However, less than 1 billion cubic metres is based on detailed surveys which take into account both quality and quantity ONWRC 2003).

Advice from some officers in the Ministry of Natural Resources and Environment is that some calculations of yield that have been undertaken previously have assumed that that aquifers can be drawn down to empty over a 25 to 30 year period. This assumption, if it is still being made, seems contrary to the requirements of the 1998 Law on Water Resources (see section 5.1).

It is probable that yield calculations have not been able to take into account the connection between aquifers and rivers, and the effect that extractions in some areas could have on dry season river flows, and the impact of declines in aquifer water on domestic supply from wells and shallow bores.

Vietnam's groundwater resources are unevenly distributed. The potential supply available from unconsolidated sediments in the northern and southern deltas areas and some other regions is substantial. The central highlands basalts also appear to be another area with good groundwater potential. The supply available in other areas, notably the North and South Central Coast regions, is however likely to be much more limited.

Ground water is generally of good quality and able to meet requirements for domestic and drinking water, especially in mountainous areas. However, salinity intrusion occurs in some coastal areas and goes far inland to some provinces. Over-pumping and inflows from use of brackish water on fish farms is also a source of salinity problems in some coastal dune areas. In some areas of the southern and northern deltas, water is acidified and affected by iron. In some large cities such as Hanoi and Ho Chi Minh City as well as the Mekong River delta and industrial centres, ground water is contaminated by industrial and other pollution.

Only a small proportion of the currently known sources of supply are exploited – a figure of 5% is quoted in World Bank 2003. ONWRC quotes a figure of 'less than one billion cubic metres per year" as the volume extracted. Either way the general picture would appear to be that current extractions from most aquifers are low relative to yield. Groundwater is currently of most importance as a source of urban and domestic supply purposes. Industrial uses are however taking increasing volumes and groundwater is used for irrigation in some areas, notably in the Central highlands where it is used for cash crops.

The low overall use of groundwater compared to total potential yield does not mean that there are no current problems resulting from over use. There are serious concerns about dropping water levels and consequent aquifer compaction and subsidence in Hanoi, where levels dropped 8 metres between 1992 and 2002 and in Ho Chi Minh where levels dropped 16 metres between 1994 and 2003 (World Bank 2003). Surface subsidence in Hanoi has been occurring at up to 45 mm per year and is resulting in structural concerns with regard to buildings, roads and drainage works. Shortages of water are also said to have occurred in

in the Central Highlands (World Bank 2003). The intention for Ha Noi is to move from groundwater to surface water over the next 5 or so years.

CONCLUSIONS - GROUNDWATER ASSESSMENT AND WATER USE IMPACTS

- Most current estimates of potential groundwater yield are of poor accuracy.
- Some assessments may have been done on the assumption that aquifers can be emptied over a 25 to 30 year period – this is contrary to the 1998 Law on Water Resources.
- Levels of groundwater use relative to potential yield appear low overall, however water level declines occurring in some areas indicates that extractions already greatly exceed sustainable yields from some aquifers or sections of aquifers.
- Problems with water quality in some areas also indicate that better management of pumping, among other measures, will be necessary to avoid further contamination of aquifers.

4. Other Imperatives for Management Change

4.1 PROTECTION OF DEPENDANT COMMUNITIES

The Government of Viet Nam has placed great emphasis on the economic development of the country, the improvement of living standards and the reduction of poverty. In pursuit of this there have been, and will continue to be, great efforts made to develop infrastructure to supply growing agricultural, industrial and domestic water needs.

However, the Government has also acknowledged the need for better consideration of the environmental and river health consequences of development and the very direct connection between environmental decline and the well being of many of the people in the country. For example, the Socio-economic Development Strategy for 2001 - 2010 states that "socio-economic is to be closely associated with environmental protection and improvement". The Government's Comprehensive Poverty Reduction and Growth Strategy also identified protection of the environment and preservation of natural resources as important to reducing poverty levels.

There are many issues relating to water which need to be considered and dealt with if the goals relating to sustainable development, environmental protection and optimising socio-economic benefits are to be achieved. These must include the preservation of flow regimes and aquifer water levels which are adequate to:

- ensure continuing long-term maintenance of processes that are essential to river health and productivity, for the benefit of current and future generations,
- prevent compaction of aquifers and declines water quality through acidification and saline intrusion and the consequent loss of water supply and other beneficial services which groundwater systems provide,
- maintain important aquatic ecosystems which depend on water from rivers or groundwater systems, and the socio-economic services which these ecosystems provide.

Viet Nam is conscious of pollution problems and appears intent on taking strong action to reduce pollution from a number of the most high impact industries. However, actions to reduce pollutants will be made much less effective if the ties between maintenance of adequate flow regimes and achieving good water quality are ignored. Some of these ties are direct and obvious, for example dilution and flushing of pollutants and mixing which sufficient to prevent eutrophication and other toxic chemical changes associated with low or no flow situations. However there are also many other links. Some result from the role played by plants and animals in the processing of organic matter and nutrients, others result from connections between flows and the erosion and accretion of sediment.

The connection between maintenance of the natural productivity of water sources and the socio-economic well being of many communities in Viet Nam is also stronger than in wealthier developed countries. Many communities depend on rivers for their supply of water for drinking and essential household needs. Rivers also provide them with fish and other food stuffs, and are their only source of water for the production of agricultural and animal products for household use. This strong link gives an added significance to

"environmental flow" and water source protection decisions. Indeed the term environmental flow is something of a misnomer in relation to Viet Nam where it is not possible to divorce protection of a water source's "environmental" health from protection of the flows needed to maintain the direct human benefits that arise from good river health. Indeed this need is recognised by the importance attached to "water for living" in the 1998 Law on Water Resources (see section 5.1). For this reason the term river health flow has generally been used in this report in place of environmental flow to reinforce that the objective of improved flow management is wider than just environmental protection.

4.2 CONSEQUENCES OF DELAYING ACTION

Delaying measures needed to ensure flows are adequate to maintain river health and protect aquifers until impacts have become obvious is not a responsible management option from either an environmental or economic point of view. This is because:

1. once impacts have occurred they are often irreversible,
2. the connection between impacts and flow change may not be identified in time to take action and adjust management,
3. even partial mitigation of impacts once they have occurred can impose large costs on government, communities and future generations, and
4. much higher economic and social costs are involved with reductions in water supply yield or electricity production once development has already occurred.

Application of river health flow measures is also an important precursor to establishment of a stable licensing system.

If licensing of water supply structures or water extraction occurs before rules that protect river health flows have been established then licence holders need to be made aware that their water supply volume is not guaranteed in the long term. They can then build this uncertainty into their project design or business management decisions.

It is also important that licensing does not result in the Law on Water Resources' compensation provisions becoming an impediment to introduction of effective river health flow measures or a financial burden on government. Options for doing this include:

- restricting the total volume of extraction licences issued to a cautious amount,
- limiting the term of the licences, or
- applying conditions to licence that permit future adjustment of infrastructure operation rules or some reduction in water supply volumes without government compensation.

Effective river health flow rules are also important to the success of any water licence trading market. Once they are in place, they allow the government to provide those purchasing licences with greater surety regarding long term access to the nominated licence volume.

CONCLUSIONS - OTHER IMPERATIVES FOR MANAGEMENT CHANGE

- The government has acknowledged the link between economic development, environmental protection and alleviation of poverty
- Adequate flow regimes must be maintained in rivers, and pumping from aquifers effectively managed if river health and the long-term productivity of rivers and groundwater systems is to be maintained for current and future generations
- Protection of supplies of "water for living" is particularly important in Viet Nam
- Maintenance of adequate flow regimes is important to achieving the countries water quality objectives
- Delaying decisions increases the risks of irreversible damage to water source health and is likely to result in greater long term economic costs to the community, government and future generations
- Water licensing and water market processes will be of less benefit if river health flow decisions are postponed.

5. Legal/Policy environment

5.1 THE LAW ON WATER RESOURCES 1998

The 1998 Law on Water Resources provides a clear foundation for the implementation of limits on water extractions and measures to protect the environment and river health. it also establishes river basin plans as a means by which this is to be done.

The Law contains numerous references to obligations relating to the protection of water sources. Article 1 places a general responsibility on all organisations and individuals to protect the water source against deterioration or depletion. Article 8 prohibits "acts which cause the deterioration or serious depletion of the water resource". Article 10 obliges those who exploit or use a water resource to protect it.

Article 11 requires that "The State shall have a plan to" ….. "restore the deteriorated and depleted water source" and encourage use of water "rationally" so that the water resource is protected.

The requirement in Article 5 that "protection, exploitation and use of water" …. "must comply with the zoning of the river basin" while Article 20 (1) states that "The regulation and distribution of water resource for use purposes must be based on the planning of the river basin and the real potential of the water source".

Article 29 makes hydro-electric production subject to plans and environmental protection measures. It requires that "the building of hydroelectric works must comply with the planning of the river basin and the prescriptions on environmental protection" and that those using water for hydro-electricity "must comply with the process of operating and regulating water ratified by the competent State agency" and that they must ensure that negative third-party impacts are limited.

The protection of water sources also extends to underground water. Article 12 states that Organizations and individuals that exploit underground water must comply with the order and norms on … prevention against depression and sinking, on the protection of water-storing layers and the related environment" Article 34 (2) states that "The issue of permits for exploiting underground water must be based on the result of basic survey and prospects of underground water and its potential and reserve." Article 44(3) requires that "The …. exploitation of underground water in the coastal areas must ensure the prevention and fight against salinity infiltration for the underground water holding layers."

The Law also establishes a permit system. All water users, other than those taking water for small scale 'family" uses must "get permission from the competent State agencies".

Two other features of the Law are relevant to decisions about river health flows and water extraction limits.

The first is its requirement with respect to protection of "water for living". Article 20, which deals with Regulating and distributing water resource states that:

"1. The regulation and distribution of water resource for use purposes must be based on the planning of the river basin and the real potential of the water source and must ensure the principle of fairness, reasonability and priority in the quantity and quality of water for living.

2. In case of water shortage, the regulation and distribution must give priority to the living purpose. For other use purposes, the regulation and distribution shall be made according to the percentage defined in the planning of the river basin and the principle of ensuring fairness and reasonability."

The second is its compensation provisions. Article 22 states that those who "exploit and use water" are entitled to compensation if "their permits for exploitation and use of water resource are withdrawn before term for … national and public interests reasons". They are also entitled to "lodge complaints and seek legal actions …. for acts of violation of the right to exploit and use water resource". As discussed in 4.2, this provides a further impetus to developing and implementing effective river health flow measures and limits to water extractions as soon as practicable.

5.2 DECREE ON IMPLEMENTATION OF THE LAW ON WATER RESOURCES

The Decree (No 179/1999 of 30 December 1999) restates much of the content of the 1998 Law on Water Resources. It does however strengthen the role of river basin plans and add some details regarding content. Article 9, directly links the granting of permits to the capacity of the "actual capacity of water sources".

5.3 LAW ON ENVIRONMENTAL PROTECTION 1993

Article 18 requires that those constructing or renovating structures must submit Environmental Impact Assessments (EIAs). In Article 17, the Law also requires those with "establishments" already in existence also have to submit EIAs. A recent review of EIAs and comments by government representatives however acknowledge that they were often of poor quality and that better guidance was required regarding their formulation.

5.4 MEKONG AGREEMENT

Article 3, titled "Protection of the Environment and Ecological Balance" requires Viet Nam to "protect the environment, natural resources, aquatic life and conditions, and ecological balance of the Mekong River Basin from pollution or other harmful effects resulting from any development plans and uses of water and related resources in the Basin."

Article 6, titled "Maintenance of Flows on the Mainstream" requires Viet Nam to "cooperate in the maintenance of the flows on the mainstream from diversions, storage releases, or other actions of a permanent nature; except in the cases of historically severe droughts and/or floods:
A. Of not less than the acceptable minimum monthly natural flow during each month of the dry season;
B. To enable the acceptable natural reverse flow of the Tonle Sap to take place during the wet season; and,

The Joint Committee, which is the implementation body of the Mekong River Commission, is in charge of developing the necessary guidelines for the location and levels of the flows.

Final rules for the management of the Mekong are to be based on an environmental flow assessment".

Article 7, titled "Prevention and Cessation of Harmful Effects" requires that Viet Nam "make every effort to avoid, minimize and mitigate harmful effects that might occur to the environment, especially the water quantity and quality, the aquatic (eco-system) conditions, and ecological balance of the river system, from the development and use of the Mekong River Basin water resources or discharge of wastes and return flows."

No formal national level arrangements similar to the Mekong Agreement exist in relation to the Red River or the other small international rivers which flow between Vietnam and surrounding countries.

5.5 AGENDA 21

The Prime minister's recent Agenda 21 Strategy decision reaffirmed the government's commitment to sustainable water development. Although much of the document was quite general and aspirational, several statements provide specific support to the setting of environmental flow rules and water use limits. In the "Sustainable use and protection of water resources" section the following are included as priority activity areas:

- water source management policies that balance the need to supply water for consumptive and hydro-electric purposes with the "the benefits of natural water and ecological system management criteria", and
- comprehensive environmental criteria on underground water, surface water, rivers, lakes, reservoirs and other wetland areas.

5.6 NATIONAL WATER RESOURCES STRATEGY

The Strategy is still under development. However it is likely that it will:

- lead to better definition the meaning of "water for living" contained in the 1998 Law on Water Resources and assign it absolute priority with respect to water sharing decisions,
- reference the link between the natural flow regime and protection of river health,
- emphasise the need to consider the link between maintenance of healthy water sources and resultant benefits to poor communities when making infrastructure and water management decisions,
- propose processes for better co-ordination of infra-structure development so that impacts are minimised and cost efficiencies achieved
- encourage consistent operation of storages
- propose that design and operation of all new storages take environmental release requirements into account,
- require that opportunities for provision of environmental releases from existing structures be explored,
- in relation to aquifers seek to reduce extractions where these currently exceed aquifer recharge rates and limit extraction growth in other aquifers to predetermined proportion of recharge,
- require that river basin plans establish rules which prevent groundwater extractions close to rivers and/or manage he timing of pumping so that impacts on dry season river flows are minimised.

CONCLUSIONS - LEGAL/POLICY ENVIRONMENT

- The Law on Water Resources and more recent policy statements provide a foundation for limiting water extractions and applying river health flow measures and for the incorporation of such measures into river basin plans.
- Groundwater resource assessment methods and practices in relation to exploitation (see 3) very clearly need to be overhauled to bring them into line with the requirements of the Law on Water Resources.
- These add to the general EIA processes applying to individual development proposals established by the Environmental Law.
- The only requirements in relation to the form such rules are the references contained in the Mekong Agreement. However, these are not so specific that they compel any particular form of assessment.
- The legal and policy statements are however all of a quite general and aspirational nature. There are few if any specific guidelines or measures in place and little practical action currently being taken to achieve the worthy intents embedded in the legal document.

6. Availability of data and information

Data is a vital ingredient in any assessment of water source capability, the likely effect of water extractions, the impact of new infrastructure and the effectiveness of alternative management rules.

There are 4 major types of information relating directly to the surface water sources that may be required in order to carry out a river health flow assessments:

1. hydrologic data – which is needed to establish how much water is present and how its availability will vary over time
2. infrastructure information – so that the impacts of dams and other infrastructure on the timing and volume of water flows can be assessed
3. water use data – so that the effect of extractions on river flows can be assessed
4. ecological information – so that the plants and animals present can be considered and the effects of flow regime change on them assessed

Water resources information in Viet Nam is said to be "relatively abundant" but its collection is fragmented and uncoordinated and there are difficulties in the extraction of information from some agencies.(ONWRC 2003).

The Department of Water Resource Management holds flow data for 173 gauging stations. The average length of flow record at each site is however only about 20 years. It is therefore likely that some relevant hydrologic information will generally be available, but it is will often require transposition and/or extension. There are however standard methods for doing this..

Information on the physical aspects of surface water infrastructure should be readily available from relevant authorities such as Electricity Viet Nam and the Ministry of Agriculture and Resource Development. It is however likely that reliable information on current and historic storage and release management arrangements will be more difficult to gather.

Data for major water users is available from those ministries and organisations responsible for the various water use sectors, for irrigation and rural water supply the Ministry of Agriculture and Rural Development, for urban water supply the Ministry of Construction and, for hydro power, Electricity of Viet Nam and the Ministry of Industry. Numerous uses also lie within the jurisdiction of provincial authorities and are monitored but to varying degrees. (VWRMAP 2004). Information for smaller scale users is likely to be very limited.

In many cases where river health assessments are required, water use information will be inadequate. The co-operation of agencies that have collected data will be critical to derivation of adequate water use data.

General ecological information on such things as fish species present etc is available however whether this is of a form that is useful for river health flow assessment purposes is not known. It is probable that specific knowledge regarding environmental responses to flow changes will be very limited..

Other types of information may also be required by some assessment processes, and these needs may extend to social and economic data.

For aquifers, the major types of information required in order to carry out an assessment relating to allowable extractions are:

1. hydrogeological data – which is needed to establish the size, type (confined, unconfined), water storage and transmission characteristics of an aquifer
2. site related water use data – so that the effect of current extractions can be assessed and any associated water level response information can be used to determine aquifer characteristics
3. location and capacity of pumping infrastructure and bore construction details – these are required to determine the possible scale of extractions and the aquifers being accessed
4. results of pumping tests and water level information – to assist in establishing recharge rates, sources of recharge and other aquifer characteristics
5. information regarding dependant ecosystems – so that the impacts of extractions on these systems can be considered when extraction management decisions are made

Information regarding 1 to 4 is patchy, particularly outside areas where exploitation is currently relatively high. It is probable that very little information is available regarding dependent ecosystem and river connections.

The following table comes from a recent summary of data and information activities in the water sector.

DATA	DATA COLLECTION	DATA ARCHIVING	LICENSING DATA
Hydrometeorological Data	There is a comprehensive hydrometeorological data network across Vietnam, mainly coordinated by HMS. However, the quality of the data is not up to international standards. Data measuring and recording technologies are outmoded.	HMS is mainly responsible for hydrometeorological data archiving, and apply some consistency to data management. Their computer systems are not up to international standards, however.	Surface water licensing has not yet been implemented in Vietnam, even though it is provided for in the Law on Water Resources.
Water Quality Data	Many ad hoc Water Quality sampling programs have been implemented, mainly on a project-by-project basis. Whether standards for sample collection, preservation and transportation have been adhered to is questionable.	Water Quality data is generally kept in simple systems (eg, spread-sheets) at laboratories, or departmental or project offices. There are no standards across Vietnam for Water Quality data management and archiving.	Wastewater discharge licensing has not yet been implemented in Vietnam, even though it is provided for in the Law on Water Resources

DATA	DATA COLLECTION	DATA ARCHIVING	LICENSING DATA
Groundwater Data	Groundwater monitoring networks have been established in the main aquifer areas, particularly in the Mekong and Red River deltas. As groundwater management issues increase in other areas, there will be an ongoing need to broaden the monitoring.	Several outmoded systems for GW data archiving exist. A GW data management and modelling system was recently developed by Haskoning for the Mekong Delta. This system could be extended to cover all of Vietnam.	Groundwater extraction wells are meant to be licensed by the Department of Agriculture and Rural Development, but this is not always carried out. Databases holding the licensing records may be held in local Department of Agriculture and Rural Development offices.
Environmental Data	National Environment Agency has a well established national program for collecting environmental data. Other data has been collected on a project-by-project basis.	National Environment Agency presumably has a system to store the data collected in its program. Other environmental data is generally kept in simple systems (eg, spread-sheets, maps) in departmental and project offices. There are no standards across Vietnam for environmental data management and archiving.	
Socio-Economic Data	A broad range of official socio-economic data are collected in Vietnam by various ministries, much of it down to commune level. Its overall accuracy has been questioned. Other S-E data has been collected by various NGOs and on a project-by-project basis/	Most of the official socio-economic data is held by the ministry that collects it. Presumably, NGOs keep their data in their own systems.	
Overall Data Coordination Arrangements	Currently the concept of custodianship has not been adopted in Vietnam. Responsibilities for ensuring that different types of datasets are managed and disseminated to meet user needs have not been allocated. Dataset types have not yet been properly defined in Vietnam.		

CONCLUSIONS – INFORMATION AVAILABILITY

- hydrologic data – is of reasonable quality and length and should provide an adequate basis for assessments – although extension or synthesis of data from nearby record is likely to be needed in many cases
- infrastructure information – data on the physical aspects of dams etc is good but information on management rules is likley to be more problematic.
- water use data – fragmented and incomplete.
- ecological information – limited

I suspect my conclusions in relation to groundwater data will be something like:

- hydrogeological data exists for individual bores, but, except for already heavily used aquifers in major cities, this has not generally yet been analysed in ways that make it useful for aquifer characterisation and subsequent use in assessments of yield.
- site related water use data – generally poor except for major developments.
- location and capacity of pumping infrastructure and bore construction details – poor except possibly for major developments?
- information regarding dependant ecosystems – very limited.

7. River Health/Environmental Flow Assessment - review and recommendations

7.1 INTRODUCTION

Environmental/river health flow assessments seek to answer the question of how much flow needs to remain, be released into or be restored to a river system to maintain or achieve a particular river health or environmental outcome. They may be carried out as part of a process for determining how to develop a water source, manage a piece of infrastructure or control water use in a way which provides an optimal mix of economic, social and environmental outcomes or as part of a process focussed only on river health or environmental improvement.

Assessments are never about protection or reinstatement of a perfect, complete and pristine 'natural' environment' – for this would require that no water use or flow regime changes occur and no infrastructure be built. However, the connection between the natural flow regime or features of it and maintenance of stream ecosystems and river function is so strong that many assessments use features of the natural flow regime as a starting point. The assumption made by all methodologies is that something less than or somewhat different to the natural flow regime can also maintain most natural features of the river or at least a desired subset of these features.

The connection between the portion of the flow regime or flow characteristic preserved and the river health outcome achieved is generally complex and non-linear. Many ecological and geomorphic functions will not occur at all until a certain flow threshold is reached and some plants and animals will show little change in numbers until the flow regime alterations pass a critical point. Therefore, assessment which focus on maintaining ecosystems rather than single species generally provide much more than a simple single flow volume recommendation.

Assessments may occur at the major basin, sub basin, river reach or individual project scale. They can also relate to all ecosystems potentially affected by river flow changes, or to particular ecosystems, or even to particular species whose protection is particularly desired – for example species that have been identified as 'endangered' or which provide particular economic benefits.

Most assessment methodologies only examine the environmental side of the environmental flow decision process. Some of the more recent "holistic" assessment methodologies go further and explicitly include consideration of social and economic outcomes.

Over 50 countries now use environmental flow assessment as a water management tool. Requirements to provide flows to protect and restore river ecosystems and protect river health are also increasingly appearing in national legislation. Examples are in Australia as part of recent water reforms, in South Africa associated with the new water laws, and in Europe in response to the European Water Directive (Arthington 2003).

7.2 AVAILABLE ASSESSMENT METHODOLOGIES

A large number and wide variety of assessment methodologies have been developed over the last 30 years. A recent global review (Tharme 2003) cites some 207 methodologies from some 44 countries. These vary greatly with respect to their objectives, complexity, the technical and scientific inputs they require, and the extent to which they incorporate other factors.

There are various ways to classify these assessment "methodologies". One of these is to categorize them as - methods, approaches or frameworks (Dyson et al 2003).

'Methods' are standardized technical assessments which generally provide a single recommended flow or flow regime.

'Approaches' may use a range of discipline experts and methods to produce a set of flow recommendations. These generally try to take a "holistic" view and provide advice regarding required flow regimes rather than a single flow recommendation. The recommendations usually aim at maintaining a particular environmental or river health state – although this state may not always be clearly or explicitly specified. Although these approaches still deal with the issue as a purely scientific problem they may provide decision makers with information about the river health outcomes that would result from a range of potential flow regimes.

Most of the methods and science based approaches can be placed into one of 4 categories (Tharme 2003):

- Hydrological methods. The recommendations provided by these methods are usually a function of one or more natural flow regime statistics.
- Hydraulic rating methods. These require development of relationships between flow and hydraulic variables (such as wetted perimeter or depth) that are believed to have environmental significance for the target river system. A threshold level of the environmentally significant hydraulic variable is then chosen and the required flow inferred from that value.
- Micro-habitat or habitat simulation methods. These require development of relationships between flows and presence of suitable hydraulic and habitat conditions, plus information about the habitat requirements of target species, to predict optimal or acceptable flow regimes.
- Holistic approaches. These aim to identify the essential features of the flow regime that strongly influence desired ecological, geomorphic or other river health outcomes for the river system. Recommended levels for each flow feature are then determined and coupled together to produce a recommended flow regime. Often the recommendations are also based on knowledge of the natural flow regime.

'Frameworks' are aimed at providing information to decision makers that can be used to help reach an optimal balance between river health, social and economic outcomes. They treat the issue as a trade-off process. They use methods or approaches relevant to each of these outcome areas to provide information to decision makers about the consequences of a range of possible management scenarios.

Tharme 2003 also refers to hybrid approaches. These have some of the characteristics of several of methods and approaches referred to above and generally have been developed for

purposes related to specific ecosystems or species or other issues associated with river flow, such as recreation and aesthetics.

The methods, approaches and frameworks referred to above are discussed in more detail in the following section. Summaries and assessments of a number of the more prominent methodologies are also included in Appendix 1.

It is also useful to recognise that assessments may be prescriptive or interactive (Brown et al 2003). Prescriptive methodologies provide a single flow level or flow regime recommendation. Such methodologies are of most use where the only goals relate to water source health and these are simple, clear and agreed. Interactive methodologies can be used to provide information about a number of development or management options and allow a range of possible flow and river health outcomes to be explored. They therefore can also provide information of use in decision processes which seek to "optimise" economic and social and environmental outcomes.

7.2.1 Hydrological Methods

These include some of the simplest assessment methods. They rely on analysis of natural flow statistics. This generally uses existing historic flow data, adjusted where necessary to compensate for the effect of dams and water extractions. Where reliable computer models exist, these may also be used to produce natural flow data.

The natural flow data is analysed to find the flow rate equal to the statistic on which the method is based. The statistic used is usually one which is believed to result in a flow rate which is the minimum required to achieve a particular "level" of river health, permit target species to survive or allow some process to continue to occur. The statistic may be a flow percentile, but other forms of flow statistic are used by some methods

The methods discussed in Appendix 1 of this report are:

- The Tennant (also called the Montana) method.
- The Texas Concensus Three Zone Concept
- Range of Variability Approach (RVA)
- Natural flow indices

These methods can be carried out in the office without any additional ecological information or any site related data other than flow. However, only the Range of Variability Approach (RVA) could be used in Viet Nam without first checking the applicability of the methodologies and its flow recommendations to this country's rivers. Once checking and any necessary reformulation was carried out individual assessments using Tennant etc could be done quite rapidly.

The simpler methods, such as the Tennant method, only establish a single minimum flow point. Ecologists would generally agree that maintenance of river health requires provision of an adequate flow regime (see section 2.1 of this report) rather than a particular single flow. Methods which provide a single "critical" flow point may however be valuable in certain restricted circumstances. The primary potential uses for a hydrologic method in Viet Nam are likely to be:

- establishment of consistent flow levels at which extraction management measures are applied in unregulated rivers,
- as the flow component of a water use versus flow index that could be used for ranking the water use related risk to river health on unregulated rivers, or

- as the basis for setting of minimum release requirements for small dams or dams on systems where the harm caused by changes in river flow was likely to be of little importance – for example where flow changes were only significant over short reaches of river – or was related primarily to increases in the frequency of low or zero flows.

The Texas Concensus Three Zone Concept is of interest primarily because of the way in which it makes flow rules dependent on water supply risk, current flow conditions and time of year. Similar concepts have been used to derive flow rules for river health management purposes in Australia. In many circumstances in Viet Nam it may also be appropriate to formulate river health flow rules in ways which take into account the water supply situation as well as natural factors such as time of year and current flows.

The Range of Variability Approach (RVA) provides a default recommendation of one standard deviation either side of the mean for each of the 32 parameters it uses. However expert guidance should really be used in choosing the range of variability for each variable that is likely to produce the intended ecological and river health outcome. The Indicators of Hydrologic Alteration (IHA) are the set of indicators which the RVA approach utilises. They have a potential value on their own as a "powerful tool for the calculation of high information, non-redundant indices describing the major components of the flow regime" (Olden and Poff, 2003). They therefore could be used for assessing flow regime changes and the flow regime benefits of potential management measure.

7.2.2 Hydraulic Rating Methods

Hydraulic methods use calculated values of wetted perimeter, depth, velocity or other variables as indicators of satisfactory habitat. The required flows are determined by hydraulic calculations (Mannings or HEC).

Generally the objective is maintenance of fish habitat and, in particular, connectivity between pools. It is assumed that hydraulic conditions at hydraulic control points are good indicators of habitat condition and therefore that maintenance of flow at some minimum level (or greater) will maintain populations of the target species.

The wetted perimeter and R2Cross approaches were developed for small to medium unaltered pool and riffle rivers in the USA. These, and most other hydraulic approaches, are most applicable to unaltered alluvial systems where river flows rather than local geological features or human intervention determines the form of the river channel.

These hydraulic methods result in single minimum flow recommendation. As discussed in 2.1, ecologists would generally agree that maintenance of river health requires provision of an adequate flow regime rather than just provision of a particular minimum flow. Hydraulic methods could still however be applicable in Viet Nam in the circumstances outlined in 7.2.1 where they may also have the advantage that no historic or calculated hydrologic information is required to apply the methods. However, the limitations regarding the types of rivers to which they can be applied (unaltered, alluvial, pool and riffle) probably means that there are few river systems in Viet Nam to which the methods could be applied. Of further concern is the need for a high level of consistency in the choice of cross sections and in use of Mannings, HEC or other relevant flow estimation methods.

7.2.3 Habitat Simulation or Microhabitat Modelling Methods

These methods have generally been devised and applied in North America and Europe. They require creation of relationships between hydraulic conditions (depth, velocity etc) and "suitability" of habitat to target species. These relationships are then used to determine how habitat availability varies with flow and consequent changes in hydraulic conditions. This knowledge can also be used to determine how habitat availability will vary under flow regimes that might result from different development or management scenarios.

The methods target preservation of suitable habitat conditions for particular target species rather than preservation of ecosystems. They have generally been used in relation to fish species.

Detailed survey of channel form and river condition for the river systems or river reaches of interest is a necessary part of the process. Also central to it are the relationships between hydraulic condition, habitat type and species presence. These generally also require extensive collection of field data, preferably from the target river. Pre-determined relationships based on data acquired elsewhere may be used, however this of course diminishes the reliability of the approach.

These methods provide more ecologically valid information than simplistic hydrologic or hydraulic methods which provide only "minimum flow" recommendations. They also provide information that may be useful in determining the tradeoffs between environmental and economic outcomes associated with alternative development or management scenarios. There are however significant problems, other than cost, which work against use of these methods (see discussion of IFIM/PHABSIM in appendix 2).

IFIM/PHABSIM and similar closely related computer packages are the most frequently used habitat simulation methods. IFIM/PHABSIM is therefore the only habitat simulation method discussed in detail in Appendix 2.

7.2.4 Holistic Approaches

Holistic approaches are most prominent in South Africa and Australia. These countries lack the large scale commercial and recreational freshwater fisheries that exist in the USA and Canada. The emphasis in South Africa and Australia has therefore been on preservation of river ecosystems and overall river health rather than preservation of particular species such as salmon and trout. The techniques are now used in a number of countries in Europe, Asia and Latin America (Tharme 2003)

The original philosophy underlying holistic approaches was that water belonged to the environment but that, on occasions, there was "excess" water that could be taken or stored. Another way of saying this is that if the critical features of a natural flow regime can be identified then they can be combined into a new, but not entirely natural, flow regime that is capable of maintaining target ecosystems and natural functioning of the river system. This was modified over time to become volumes of water that could be taken without shifting the ecosystem from a state that approximated the pre-development situation to a less desirable state (Arthington 1998). Some holistic methodologies are now also used to predict probable river health changes that may result from flow regime changes.

There are a variety of methodologies that can be categorised as "holistic". Holistic methodologies may be either "bottom up" or "top down". 'Bottom-up' methods 'construct' a flow regime by adding desired flow components together starting from a baseline of zero flow. 'Top-down' methods start with the natural flow regime. They then try to determine

either the degree of flow regime modification that can occur before river health impacts exceed some defined acceptable levels, or the relationship between flow regime modification and the degree and type of impacts.

Holistic approaches share a number of assumptions regarding the flow regime needed to maintain ecological sustainability or produce a particular ecological outcome (Gordon et al 2004):

- some elements of the natural flow regime cannot be scaled down but must be totally retained,
- some elements can be scaled down,
- some can be omitted altogether, and
- variability of flows should mimic the natural flow regime in cases where the goal relates to retention of aspects of natural ecosystems and functions.

High flow and low flow conditions are generally regarded as being more important than mid-range flows. This is because they stress some organisms, which prevents them from becoming dominant and because they provide opportunities for other organisms. Many geomorphic and ecological functions also do not occur at all until river levels or durations of flow at given levels exceeded certain threshold values (eg sediment movement, wetting of areas on higher parts of river banks and on floodplains, successful breeding or movement of organisms). High flow events which closely follow a similar sized event are often also regarded as of less importance as it is assumed the river process and ecosystem functions they trigger have already occurred.

Ecosystem components that are commonly considered include riverine geomorphology, hydraulic habitat, water quality, riparian and aquatic vegetation, macro-invertebrates, fish, and other vertebrates having some dependency upon the river and its riparian habitats (e.g. amphibians, reptiles, birds, mammals). The flow requirements of these components or the impact of flow changes on them can be evaluated using data derived from field studies, desktop assessments based on literature or experience elsewhere or use of expert opinion. Of course the reliability of impact projections drops as you move further away from relationships derived from actual observations at the site.

The South African Building Block Methodology or BBM (King et al. 2002) was the first holistic approach to be developed. It uses a highly structured expert panel approach to design a flow regime that it is believed will produce a pre-determined river health outcome.

Several expert and scientific panel methods have also been developed and applied in Australia. These have, however, not generally been as highly structured as the BBM approach.

The Benchmarking Methodology, which has been used in Australia, uses information about impacts that have occurred elsewhere to develop relationships between flow regime change and ecological and geomorphic response. An export panel is used to provide advice during the relationship development phase.

Downstream Response to Imposed Flow Transformations (DRIFT) framework, developed in South Africa, incorporates assessments of social and economic impacts as well as assessments of ecological impacts. Its ecological impact module requires a highly structured assessment of the impacts that would be expected with given changes in a range of hydrologic parameters. DRIFT facilitates assessment of a range of development and/or management options once the relationships between flow change and impacts have been set up. However, like all of the more complex assessment methods, the reliability of these

impact projections is highly dependent on a good understanding of the relationship between flow and ecosystem behaviour.

The Flow Restoration Methodology and similar approaches undertaken in Australia have been used to assess how an existing regulated flow regime could be modified to restore some of the desired natural characteristics of a river. These approaches involve an assessment of the current impacts of flow regulation and use, and identification of possible flow and water use management options and potential river health benefits. These options are then computer modelled and the implications for water supply yields and long-term flow regime benefits are assessed.

Holistic river health flow assessments all require substantial amounts of data and technical assessment. Good information about the natural flow regime and the flow regime that would result from various development and management alternatives is necessary for all but the BBM methodology. Holistic assessments can however cope with uncertainty about ecological impact although the reliability of assessments is compromised if key information or understanding is missing.

The most advanced holistic approaches are relatively time consuming and costly. They have generally been applied to situations involving medium to large-scale developments and rivers of high conservation value or where supply impacts could be significant. They have also often been used in cases where there was substantial conflict between stakeholders about development or management decisions. Simpler approaches (e.g. expert panel assessments or more ad hoc "holistic methods") are appropriate for lower profile cases or situations where the options are very limited.

7.3 DISCUSSION AND CONCLUSIONS

7.3.1 How can river health flows be delivered

Before embarking on a discussion of the relative merits of the assessment methodologies outlined above, it is worth considering the possible management options that might be used to deliver or preserve a particular flow regime. Management options fall into two broad groups.

The first can be termed "active" management options. They affect the volume of water which enters the river system, and are therefore only applicable only to regulated river systems. Such rules can be:

- dam operation rules –which specify particular operational standards such as minimum release rates or limits on the rate at which releases may be altered,
- water sharing rules – rules which set aside a portion of the available water which can then be used to make releases for river health purposes, generally when predetermined circumstances occur,
- inflow sharing rules – rules which require that all or part of the natural inflows to a storage be passed through the dam for the benefit of the river health downstream.

The second can be termed "passive" management options. They affect the volume of water that can be taken out of the river system – and therefore the portion of the flow entering the system that remains available for environmental protection purposes. Passive rules can be applied to either regulated or unregulated river systems. Such rules can involve:

- limits on the volume that may be taken out over a particular prescribed period, or
- reduction or suspension of extraction rights at particular times of the year or when flows drop to prescribed levels.

There are generally a number of possible management options that could be used for achieving a particular change in the flow regime of a regulated river. It is, however, often difficult to assess the long-term flow regime and water supply impact of any particular rule. As well, two rules which deliver the same river flow impact may have quite different impacts on water supply and economic outcomes. Because of this there is often no alternative but to use computer simulation modelling techniques to determine the most appropriate river health flow rules for regulated river systems.

In unregulated systems only passive management options can be used and much simpler techniques can be employed to determine river flow and water supply outcomes.

7.3.2 Factors affecting the choice made

A comparison of water use and river flows across Viet Nam (see 2.2.1) indicates that water exploitation in many of Viet Nam's rivers is already at levels where significant river health damage will occur without careful management. It is also inevitable that there will be continuing rapid growth in water extractions and water storage and flow management infrastructure. Decisions about infrastructure development and water extraction management for most of Viet Nam's rivers will seldom be about the limits that need to be applied to maintain the river in a close to natural state. What they will instead need to be about is reducing river health damage and striking a better balance between environmental, economic and social outcomes.

No one approach will suit all situations and there are a wide variety of factors that will affect the form and detail river health flow measures of any assessment associated with their formulation. However, I believe the major factor is whether the river is regulated or unregulated. The reasons for this are outlined in the following table:

FACTOR	UNREGULATED RIVER	REGULATED RIVER
Complexity of flow regime impacts	Significant flow impacts are usually restricted to loss of flow from the low flow portions of the flow regime. The medium and high flow regime is normally relatively intact and there is little change in seasonality or most flow variability statistics.	Flow impacts may be complex and involve both losses and additions of flows at particular times. Impacts will affect the medium flow portions of the flow regime and may also affect high flows if the storage is large. Seasonality may be altered and short term variability of flows is usually also affected.
Scale of impacts	Generally not as large as in regulated rivers.	Generally larger than in unregulated rivers
Options for adjusting flow regime outcomes	The only options involve restrictions on extractions.	Options may include changes to dam operation, water sharing rules, extraction rules or some combination.
Economic consequences	Usually relatively easy to assess as the likely impact of flow restrictions on diversions and economic outcomes.	Different options may affect different groups in the community and have quite different economic impacts even though the flow regime impacts are the same

7.3.3 Unregulated Rivers

As indicated above, in unregulated rivers, the only way in which the flow regime can be adjusted is through restrictions on extractions. This can only have a significant impact on flows, and therefore on river health outcomes, when extractions are significantly and critically altering flows – which is almost always only at low flow times. It is also worth noting that the individual user who have to be controlled are generally small scale and numerous. Monitoring costs and other management difficulties makes it unlikely that any but the simplest management rules could be successfully applied to them.

In Viet Nam there is a second imperative, one that is clearly enshrined in the 1998 Law on Water Resources. This is that priority must be given to protection of the quantity and quality of water for living particularly during times of water shortage.

Currently there are no management rules or processes in place in Viet Nam's rivers which give effect to the Law on Water Resources' "water for living" requirements. , The water strategy will be seeking to have management measures put in place in all rivers to protect water for living. The most likely means for achieving this will be by restricting or prohibiting extractions for lower priority purposes in low flow periods. To do this will probably require licensing of extractions for these lower priority purposes. Extraction restrictions can then be specified on these licences or extraction can be made subject to the announcement of restrictions at critical times. Clearly ensuring compliance with restrictions will be a major challenge however.

Protecting both the quality and quantity of "water for living" along the full length of a river system should go a long way toward improving flow related river health and environmental outcomes in dry times. There should also be no need to justify the restrictions environmentally or to have to counter economic hardship arguments that could no doubt be mounted by lower priority water users who would be affected by extraction restrictions.

Therefore the logical first step, prior to any assessment of river health water needs, is to establish extraction management rules which protect the quantity and quality of water for living from impacts caused by extraction of water for lower priority purposes. Once the activities that are covered by "water for living" are clearly established it should not be too difficult to determine the quantities of water required for these purposes. The more difficult assessment will be whether additional protection of flows is needed to minimise water quality problems that arise when flow rates decline. Such assessments will need to take into account existing pollution loads and local hydraulic conditions.

In unregulated rivers, significant river health protection should result from management measures which secure the quantity and quality of flow needed to satisfy water for living requirements. Such measures should improve connectivity between river sections and reduce flow related water quality declines in rivers where dry season extractions are currently accounting for a major portion of dry time flows.

The questions that then need to be addressed are whether there are likely to be any ecological reasons for applying stronger restrictions on extractions during low flow periods and, if there are, what assessment methodology is appropriate for determining them.

With respect to the first question, species present in those rivers in Viet Nam that are subject to very low dry season flows must have a good tolerance for such conditions. There are also no obvious high profile fish or other species, such as trout or salmon, with

particular identified flow needs that could drive decisions in favour of stronger protection measures in unregulated rivers. Given this, and the improvements that would arise from protection of "water for living" flows, it is my judgement that no additional river health flow measures would generally be justified or be likely to win approval in the face of the strong economic arguments that would be mounted against more severe restrictions.

If this conclusion is true it makes it unnecessary to deal with the second question, regarding appropriate assessment methodologies for unregulated rivers.

7.3.4 Regulated rivers

As already discussed in 7.4.1, the flow regime impacts in regulated rivers are generally much more complex and of a greater scale than those in unregulated rivers, the options for adjusting the flow regime much greater and the economic consequence more variable. Protection of flows needed to meet water for living requirements is therefore unlikely to significantly reduce flow regime change or alter the impacts of change on river health. To do this will require more substantial changes to dam and/or water extraction management. Therefore some form of river health flow assessment will be required.

One practical advantage, compared to unregulated rivers, is that there are generally only a small number structures whose operation needs to be monitored in detail. A few major extraction points may also account for a large proportion of total water diversions and use. It should therefore generally be much easier to implement complex management rules and assess compliance on regulated rivers than on unregulated rivers.

The factors that I believe are most important in determining the most appropriate methodology for Viet Nam's regulated rivers are:

1. the need to consider environmental issues as related to protection of ecosystems not protection of singles species,
2. the variable and generally limited ecological information that is available,
3. the large amount of proposed new development, and
4. the importance of river health protection to the long-term welfare of many communities and the varied nature of the dependences that they have.

Almost all ecologists would now agree that while "minimum flow" rules might provide some useful protection benefits for some fish species, they are of very limited value in relation to long-term ecosystem protection. What is important is maintenance of flow regime that contains as many as possible of the critical elements of the natural flow regime.

For this reason alone I would contend that none of the methodologies that produce a single minimum flow recommendation are of value in relation to Viet Nam's regulated rivers. There are however other reasons for rejecting these approaches. Even though the hydrologic and hydraulic methods that have been used to develop "minimum flow" recommendations are simple, they give inconsistent results even when applied to a single region (see Appendix 3). It is also doubtful whether the available ecological information is sufficient to allow the sensible and agreed modification of these rules to suit Viet Nam.

Habitat simulation methods are more ecologically valid than simplistic single value "minimum flow" methods. They can also provide data that is useful as the environmental input into decisions about tradeoffs between economic, social and environmental outcomes. However I do not believe they provide an adequate means for assessing river health flows for the regulated rivers of Viet Nam.

Habitat simulation methods are still targeted at the requirements of particular species rather than general ecosystem health, and even there fail to address flow variability factors that affecting the reproduction and migration behaviours of their target species. they certainly do not address the flow variability factors needed to maintain ecosystems and associated geomorphic issues. The processes involved in determining "suitability indexes" for Viet Nam's species are also likely to be subject to many confounding factors, such as the impact of fishing, water quality changes etc . The study process is also costly and time consuming.

That leaves only the Range of Variability Approach (see Appendix 1 for details) and the various Holistic approaches as potential methodologies.

The Range of Variability approach facilitates testing and development of environmental flow rules that aim at retaining critical elements of the natural flow regime. However ecological input is required to nominate "acceptable" variations from natural and draw, assess the relative importance of changes in one parameter versus another and draw ecological impact conclusions. RVA and the Indicators of Hydraulic Alteration (IHA) statistical analysis package can therefore really only be used with any confidence for the design of environmental flow rules if they are incorporated into some form of "holistic" approach.

That leaves only the Holistic Approaches. These do facilitate consideration of the whole riverine ecosystem, not just single species. Reliable outcomes depend on good information about the links between the environment and the flow regime. However, the processes do allow for expert opinion to be incorporated. They therefore provide opportunity for pooling of understanding and information and allow best use to be made of whatever information there is available. The approaches also provide information that can be used to inform communities about likely impacts and benefits.

Before discussing the applicability of these approaches, it is worth considering the two general situations in which they could be used. The first is in relation to existing dams and river regulation, the second is in relation to new projects. The table below sets out some of the differences between these two situations.

FACTOR	EXISTING	PROPOSED
Opportunities to modify flow regime outcomes	Usually limited – structure locations cannot be moved, sizes can generally not be altered and modifications are usually costly. As well, downstream development that depends on continued access to water has generally usually occurred.	May be substantial opportunities. This may even extend to changes in location, size and configuration of dams and other structures and limitations on allowable growth in downstream water use.
Likely funding available to support assessment process	Direct new government funding would be required.	Funding required is generally small relative to total project cost. Project donors may be willing to fully or partially fund assessments to ensure they can demonstrate to critics that environmental concerns are being properly addressed.
Starting point for assessment	The current, altered flow regime and already altered downstream environment.	The current flow regime and downstream environment, which may be largely unaltered by flow changes if the river is currently unregulated.

Likely support for environmental flow rules	Unless the existing impacts are large and a substantial portion of the population who would be affected is aware of them, it is likely that any proposals for large scale changes will have many more opponents than supporter.	If possible impacts can be explained it is likely that there will be significant support for efforts to alter developments or water management arrangements.

Of the holistic approaches reviewed, the most comprehensive is the Downstream Response to Imposed Flow Transformation (DRIFT) approach developed in South Africa. Benefits it offers which most other holistic methodologies do not are:

- it provides an efficient and structured and well documented process for relating flow regime change to ecological impact,
- it is a "top down" process that doesn't rely on any initial definition of desired outcomes, it is therefore useful where the goal is to "optimise"
- it explicitly considers and requires quantification of impacts on household services such as water supply, food sources etc
- once the relationships between flow regime change and consequences are developed, the consequences of any number of future flow regimes arising from potential management or development scenarios can be assessed quickly
- it allows prediction uncertainties to be recognised and incorporated into the information provided to decision makers

To do it well however involves considerable cost and time and data input. It is therefore probably most suitable to situations where money is likely to be available to properly support the assessment and the potential benefits of such a detailed process are worth the effort involved. This means that a DRIFT assessment would be most justified in relation to new projects, and would, in any case, provide much of the information that should be incorporated into Environmental Impact Assessments. As mentioned in 5.3, a recent review of environmental impact assessments indicated many were of poor quality. A requirement to undertake DRIFT may assist in improving standards in relation to new water resource projects. For existing development, use of DRIFT would only be justified where major management changes to operation or structures were possible and being contemplated, and where the potential impacts or benefits were considerable.

For existing situations where the changes and potential impacts were smaller the Flow Restoration Methodology, and similar approaches used in such investigations in Australia may be more appropriate. Such an approach can be structured in each case to focus only on the type and scale of changes that can reasonably be contemplated and on those river health improvements that are most strongly desired. There is really no well developed "off the shelf" model for flow restoration assessments, which is probably not a serious shortcoming as it is probably beneficial to tailor the approach each set of circumstances. However, it should be possible to establish a general outline that could be used to guide such process in Viet Nam. Such a process could use the Indicators of Hydrologic Alteration as the basic set of flow regime comparison statistics.

7.4 SUMMARY OF RECOMMENDATIONS

For unregulated rivers:

- do not carry out any environmental assessments
- instead devise procedures for assessing "water for living" requirements with respect to both quantity protection and flow related quality protection
- institute management which restricts lower priority uses of water whenever maintenance of adequate flow to service water for living requirements is threatened

For regulated rivers – new development

- Require use of a methodology based on the South African DRIFT process.

For regulated rivers – existing development and water use

- Where major changes are being contemplated or potential impacts are large require use of a methodology based on the South African DRIFT process

Where only minor changes are being contemplated, changes are of a very limited type or potential impacts are small, a Flow Restoration Approach should be used together with any other assessments that may be needed to inform decision makers regarding the scale of any related economic or social impacts.

8. Groundwater methods/ approaches

8.1 INTRODUCTION

There is no accepted worldwide definition of "sustainable yield" for groundwater systems.

Most definitions are aimed at sustaining the long-term benefits of aquifers as a source of reliable, uninterrupted water supply. The considerations in relation to setting sustainable extraction rules are therefore:

1. rate of recharge,
2. maintenance of structural integrity of the aquifer – prevention of compaction
3. prevention of water quality deterioration

More recently efforts have been made to incorporate the needs of dependent ecosystems. The most obvious examples are ecosystems such as wetlands and limestone cave systems. The most common dependent ecosystems are, however, rivers which are heavily depend on groundwater inflows for maintenance of flow during dry periods. This connection is undoubtedly a very strong one in Viet Nam.

The exception to this is where the aquifer is disconnected from surface sources of recharge and the water in the aquifer is "fossil water". In such cases any pumping is unsustainable and the management decision is really only about whether to exploit the resource now or reserve it for future use. This situation generally only occurs in arid areas- so it is doubtful that there are any examples in Viet Nam.

The connection between dry season river flows and groundwater in Viet Nam is a more critical consideration than in many other countries because of the importance of rivers as a direct source of "water for living" and as a source of fish and other food.

8.2 ASSESSMENT METHODOLOGIES

It is not possible to accurately assess the maximum long-term level of extraction that a groundwater system can sustain, without damage to its structural integrity or water quality decline, without detailed understanding of its response to extraction. The only way in which this can be obtained is through a sufficiently detailed groundwater computer model which can adequately represent the hydraulic characteristics of the system and its connection with the surface water system.

There are a many groundwater computer models in use throughout the world. However, it is beyond the scope of this project to try to assess which one or more are most suitable for use in Viet Nam. However, what can be said is, that the construction of a reliable groundwater model for any aquifer system can be a time consuming and expensive task. It is also one that requires good quality and well analysed information concerning aquifer characteristics. For a model to be dependable, it also generally true to say that there should be a reasonable period of water use and aquifer response information available to permit model calibration.

It is however only necessary to go to the cost of construction of a computer model in circumstances where:

1. there is some significant risk that damage to an aquifer will occur as a result of current or anticipated extraction,
2. a valuable dependent ecosystem is at stake,
3. or where water extractions from an aquifer may interfere with maintenance of dry season flows in rivers.

Given the low level of extractions relative to current estimates of yield, it is unlikely that circumstance 1 presently exists for most aquifer systems in Viet Nam.

In the absence of a computer model, the only reasonable approach is to put in place a management regime that limits these risks to a low level. Such a regime needs to:

1. limit total extractions to a level which will not cause an overall decline in aquifer water levels, which means limiting allowable extractions to a conservative estimate of recharge,
2. prevent localised declines in aquifer levels that might cause problems with water quality, loss of dry time flows from rivers or loss of supply to dependent ecosystems,
3. trigger the construction of a computer model when the existing or authorised level of extractions reaches the limit set by 1.

The limit needed to achieve 1 must be based on a conservative estimate of recharge. Recharge of aquifers from rivers and overbank flows are best assessed via a computer model which can adequately link the surface and groundwater systems. In the absence of such a model, the only source of recharge that can be assumed with confidence is rainfall.

Providing extractions do not exceed aquifer recharge, local declines in aquifer levels will, for all practical purposes, reflect the cone of depression associated with each bore. The extent of the cone of depression of each bore is a function of the pumping rate and the transmissivity of the aquifer and is relatively easily calculated. This means that once issue 1 is resolved, protection against the problems listed in 2 can be achieved via controls on bore locations that ensure their cone of depression will not intersect rivers, dependent ecosystems and areas of saline of poor quality water will not be drawn into the aquifer. In the absence of such calculations standard conservative setback rules which prohibit bores within a specified distance of nominated sensitive areas.

8.3 RECOMMENDATIONS

That for all aquifer systems where no reliable computer currently exists and there are no apparent problems related to over extraction:

- interim sustainable limits be calculated based on conservative assumptions regarding recharge from rainfall only,
- that a procedure for assessing likely cones of depression and appropriate setback rules or conservative standard setback rules be developed, and
- that a management regime be put in place which establishes a permit and management system which ensures that limits and setback rules are observed.

That for all aquifer systems where a reliable computer currently exists, there are already problems related to over extraction or potential extractions exceed the limits set using the procedure outlined above:

- limits on allowable extractions be calculated using computer models,
- that these calculations be based on the assumption that the management goal is to ensure the aquifer remain a long-term source of good quality water, and
- that such calculations take into account impacts on dry season river flows and any identified dependent ecosystems.

Further recommendations would be that:

- restrictions be applied to extractions under any permits issued to existing bores which are within allowable setback distances of rivers and that these which mirror any restrictions applied to permits to extract water from the river itself, and
- that existing bores within setback distances from other sensitive areas be progressively eliminated or made subject to rules which appropriately limit the risk to these sensitive areas..

Appendix 1 - Glossary

cone of depression	The conical-shaped depression of the water table around a pumping well caused by the withdrawal of water.
endemic species	Those species of plants and animals that were present before introduction of new species by humans
eutrophication	This occurs when the concentration of plant nutrients in water bodies, such as lakes, estuaries, or slow-moving streams reach levels that that stimulate excessive growth of algae and weeds. These then die and decompose with the result that dissolved oxygen levels in the water may reduce to levels that kill fish and other organisms.
flow percentile	In this report the flow percentile indicates the percentage of time that the flow is equalled or exceeded in a river. For example flows in a river are equal to or greater than the 50th percentile flow 50% of the time.
natural flow	The flow that would occur in a river if there were no dams or other water management infrastructure and there was no extraction of water from the river.
natural flow regime	The pattern of flows that occurs or would be expected under natural flow conditions. It is generally derived from analysis of historic flow data, with appropriate adjustments to account for any significant flow changes that have resulted from upstream dams and water use. Computer models, set to represent natural flow conditions may also be used to produce natural flow data.
regulation	In the context of rivers it means the storage of water behind dams and weirs and its subsequent release, as required, to meet downstream water demands.
regulated river	Is a river whose flows are at least partially influenced by storage and release of water by dams or weirs.
yield	The volume of water which a river can provide with a particular combination of - dams and other water supply infrastructure, - irrigation and other water use development, and - management rules
unconsolidated sediments	Material derived from the disintegration and erosion of consolidated rocks on the land's surface, as well as sediments deposited by coastal and glacial processes. Unconsolidated materials include, in order of increasing grain size, clay, silt, sand, and gravel.
unregulated river	Is a river whose flows are not influenced by storage and release of water by dams or weirs, although they may be affected by extraction of water.

Appendix 2 – River Health/Environmental Flow Assessment Methodologies

TENNANT OR MONTANA METHOD

Where developed

USA

Where applied

Widely used in the USA, but it has also been used in many other countries, frequently with modifications based on local hydrologic, geomorphologic or ecological observations and circumstances.

Description

Hydrologic method –interactive

The Tennant method establishes a simple look up table which relates expected river condition to streamflow. The streamflows nominated are proportions of the long-term average flow.

Note:	Some authors refer to the Tennant/Montana method as providing a relationship between expected river condition and the proportion of the Mean Annual Flow. This could be taken to mean that the Montana Method is relating the total volume of flows present over a year to expected condition. This is not the case. The relationships established by the Tennant/Montana method provide an instantaneous flow rate that is the minimum that the authors say should be maintained at all times to sustain the nominated level of river condition. They do not refer average flows rates over a year or any other long-term period.

The original method cited seven expected conditions and required flow rates. The expected conditions were based on observations of circumstances in rivers in streams in Montana, Wyoming and Nebraska at different flow levels.

The finding from the observations was that when flows were expressed as a proportion of the average flow the circumstances at the sample sites were very similar for comparable flows. For example, when flows were less than 10% of average flow gravel bars were exposed, fish were concentrated into deep pools and large fish were unable to move across riffles. These circumstances were said to represent "poor" conditions. By 30 % of the average flow most substrate was found to be covered. This was said to be a "fair" condition. Similar somewhat subjective judgements were made regarding river conditions at higher flow levels. The highest of the Tennant/Montana recommendations is a flushing flow (equal to 200% of average flow), rather than a flow that it recommends be maintained.

Information required to apply technique

An accepted relationship between average annual flow and habitat condition.

Good quality natural flow data or reliable estimated data..

Output produced

Recommended minimum flow for maintenance of a target environmental condition.

Strengths

Relatively simple and low cost to apply and requires no fieldwork once any needed recalibration is carried out.

Weaknesses

The implicit assumption of the Tennant method is that a stable flow of some nominated level, with occasional freshes, will suffice to preserve a river and its dependent ecosystems in the target state over the long-term. This simplistic view would not be supported by ecological scientist as a flow regime that is adequate to support natural river ecosystems or river health as it lacks the necessary flow variability and range of flows.

It requires that the general form of the river under assessment be similar to those on which Tennant's method was based. It also requires that the relationship between the average flow volume in the river and the flow needed to perform the environmental functions on the methods "fair", "good" etc ratings be similar to the relationship in the streams Tennant studied. It is quite likely this is not the case in most streams in Viet Nam.

The method depends on the availability of sufficient good quality streamflow data or some other means by which to establish a reliable estimate of the average flow at a site.

Requirements to adapt to Viet Nam

There are many differences between the hydrology and geomorphology of streams in Viet Nam and those in the United States and most other locations where the Montana method, or variations on it, have been employed. It is therefore likely that the relationship between average flow and the flows which indicate the poor, fair or good habitat conditions on which the method is based would be different here. It would be dangerous to adopt the method recommendations without an assessment of their validity to this country.

The hydrology of Viet Nam is also far from homogenous. The same comment applies to river geomorphology. Some researchers (Orth 1981) have shown that, even within the central USA, the differences are sufficient to warrant recalibration. Experience overseas demonstrates that a number of calibrations would be required to cover a country like Vietnam.

Calibration of the method to a range of local circumstances would therefore be needed. This would require expert assessment of the relationship between flow and habitat condition at many locations (say a minimum of 10 locations for each hydrologic/geomorphic type).

It would also require that high quality, reasonably long term flow data be available at sites used to develop the relationships. Long term data would, of course, also be required at each site for which flow recommendations were to be developed.

Suitable for use in assessment of management options/ planning negotiations/ interaction with stakeholders and public

Of little value.

Suitability in Viet Nam

Not suitable for establishing comprehensive environmental flow rules for major storages or regulated rivers.

May be of some limited use in unregulated rivers in relation to low priority uses of water, however, the method would not seem to offer any particular advantage over rules based on low flow percentiles. Percentiles may in fact be more indicative of stressful conditions for fish and other aspects of river health than a statistic based on average flows. This is because the average flow is generally heavily dominated by flood and very high flow periods of the year.

INDICATORS OF HYDROLOGIC ALTERATION (IHA)

RANGE OF VARIABILITY (RVA) METHOD/

Where developed

USA

Where applied

IHA software has been used for impact evaluation purposes and research purposes in many locations in the USA and on some sites in Canada, Scotland, south Africa and Germany. The RVA method has also been used to develop or assess flow management options in some systems.

Description

hydrologic method – top down and interactive

The IHA Analysis (Richter et al) was developed by the Nature Conservancy to facilitate consistent assessment of the characteristics of a flow regime and assessment of changes in flow regimes that have resulted from dams, water extractions or land use changes. There are 32 hydrologic parameters used which are claimed to have ecological significance. They can be grouped into 5 categories:

1. The magnitude of monthly water conditions – the mean flow value for each calendar month
2. magnitude and duration of annual extreme water conditions – annual maxima and minima of various durations
3. Timing of the annual extreme flow – maxima and minima
4. Frequency and duration of high and low pulses
5. Rate and frequency of water condition changes – no of rises and falls and the mean rate of change

Any period of data can be used (although this affects whether some of the duration statistics can be produced). Flow levels or flow volumes can be used.

The output of the assessment is a time series of annual variations in the value of each of the flow statistics over the analysis period, together with the average value and measures of variation (standard deviation or co-efficient of variation). These can be displayed graphically to demonstrate the scale of change.

The RVA uses the IHA parameters. The premise is that there is a strong relationship between maintaining natural flow variability within or close to its natural variability and long term retention of natural ecosystems and maintenance of natural river processes and form The method is therefore suited to circumstances where these are the management goals. The method bases the choice of flow management targets on the statistics generated via IHA analysis. Where possible expert opinion or ecological studies should be used to provide management targets and assist in the choice of environmentally optimal flow management options. The developers (Richter et al, 1997) recommend that RVA generated targets and the effectiveness of management rules applied in each situation be confirmed by suitable monitoring programs and that the results of these be used to adjust targets or rules if required.

Note the software and users guide is available from: http://www.freshwaters.org/tools/

Information required to apply technique

IHA - An adequate length (20 years plus) of reliable flow data for the assessment site. This can be either recorded at the site or generated data. Computer models or other flow estimation techniques which are used to generate data must however be capable of providing accurately representations of short term flow variability.

Where IHA is used to compare flow record from different data periods (i.e. actual flow record from say pre and post dam periods) assessments of data from adjacent rivers not subject to flow related developments or other methods (eg rainfall comparison) should be used to determine whether there were climate variations. Appropriate consideration needs to be taken of any identified climate variations.

RVA – availability of expert opinion of research information concerning the effect on river health of changes in flow regimes greatly enhance the dependability of the RVA method.

Output produced

IHA – provides ecologically meaningful statistics concerning natural and altered flow regime characteristics

RVA – provides flow regime targets for environmental flow measures.

Strengths

IHA parameters provide a consistent set of hydrologic impact/benefit measures and therefore a stable basis for consideration of management options.

The parameters used address the range of flow variability parameters generally thought important by ecologists and therefore should suit management decisions aimed at protection of ecosystems rather than specific species. A recent review of 171 currently available hydrologic indices (Olden and Poff, 2003) concluded that IHA provided a "powerful tool for the calculation of high information, non-redundant indices describing the major components of the flow regime".

RVA allows development of environmental flow recommendations across whole of flow regime in the absence of knowledge of species or ecosystems present or their "requirements".

Weakness

Requires good quality recorded or estimated hydrologic data (preferably of 20years plus duration) for reliable assessment of IHA parameters for natural flow conditions.

Requires a computer model to allow testing of flow management options against flow targets and therefore to allow design of system management rules.

Lack of expert guidance in choice of acceptable range of values for IHA parameters may lead to concentration on wrong elements of flow regime change.

In the absence of expert guidance it is not possible to assess the importance of changes in a parameter or the relative importance of changes in one parameter versus another.

Requirements to adapt to Viet Nam

IHA –None

RVA –expert opinion regarding the impact of changes in the various flow parameters in the rivers of Viet Nam or other similar rivers would be of great assistance in assessing ranges of acceptable change to parameters and therefore for development of environmental flow rules for particular systems.

Suitable for interaction with stakeholders/public etc

Useful if the connection between the IHA statistic and river system impact can be clearly articulated or where clear connections have been demonstrated elsewhere.

Suitability to water planning in Viet Nam

IHA parameters would appear to be of value for:

- consistent and ecologically meaningful assessment of the hydrologic impacts of water use development and the extent of impacts and therefore the possible long-term ecological effect of flow changes, and
- ranking of systems and sections of rivers with respect to hydrologic impact.

In the longer term, the IHA software may assist research into the relationships between river health changes and flow changes in Viet Nam by providing a consistent basis for identifying hydrologic changes.

The RVA method may provide a useful method for assessing alternative management options for regulated river systems and new developments, particularly where little specific ecological information is available. However some form of "holistic" approach add-on (such as an expert panel) is still required to make recommendations and assess results.

PERCENTILES AND OTHER NATURAL FLOW INDICES/

Where developed

Many countries

Where applied

Many countries

Description

hydrologic method – generally prescriptive

There are many techniques which set the "minimum environmental flow" as some proportion of the long term average natural flow, a natural flow duration curve value or some other more complex natural flow statistic (for example the 7 day minimum flow with a 10 year return period). The origin a number of these values is sometimes obscure and often quite arbitrary. The indices have only general ecological relevance.

Information required to apply technique

An adequate length of reliable recorded or constructed flow data for the assessment site. The length required will depend on the statistic used and on the variability of the climate in the region under assessment.

Reliable estimates of statistics related to more extreme flow statistics would require longer periods of historic flow record. Computer modelling data or other constructed flow data would be expected to be least reliable in relation to assessment of more extreme flow statistics.

Output produced

A single environmental flow value.

Strengths

Low time, cost and data requirements and limited specialist expertise required.

Weakness

The approach is simplistic and really only relevant, even for impact ranking purposes, in unregulated rivers where the only significant flow regime impact is generally loss of flow in naturally low flow periods.

Requirements to adapt to Viet Nam

A flow statistic that was suited to the hydrologic circumstances occurring in Viet Nam and which was sensitive to the scale of consumption that was occurring would need to be determined.

It is therefore likely that such a statistic would be one which relates only to low flow periods of the year in a basin and to median or less frequent flows.

Suitable for interaction with stakeholders/public etc

Rankings based on a simple low flow statistic would be easy to explain and it would be expected that most persons would appreciate the consequences of loss of large proportions of flow in dry times.

Suitability to water planning in Viet Nam

Not suitable for establishing comprehensive environmental flow rules for major storages or regulated rivers.

May be of some limited use in unregulated for impact ranking purposes or setting of flow levels at which pumping for low priority uses was restricted.

TEXAS CONCENSUS THREE ZONE CONCEPT

Where developed

Texas USA

Where applied

Texas USA

Description

hydrologic method

The planning criteria for the Texas State Water Plan set out default criteria and operational guidelines that are to be used in relation to new on river reservoirs. These are aimed at meeting environmental flow goals whilst protecting water supply and water quality during low flow conditions.

When storage levels are higher (above 80% full) the criteria specify that flow releases must be equal to the lesser of the median flow for the month or the inflow actually occurring. At lower storage levels the maximum flow that must be released decreases to the 25th percentile flow for the month and then to a n even low level in more extreme circumstances. Similar rules apply to diversions direct from the river. When flows exceed the median flow for the month, then diversion rates must be managed to ensure that at least the median monthly flow passes downstream. At lower flow levels the amount that must pass downstream decreases.

The numerical values prescribed by the guidelines are not intended to be used where more site specific information and data is available. The Plan also expects that for larger projects the actual numerical values will be determined by site specific studies.(Texas Parks and Wildlife Department 2003)

Information required to apply technique

A length of reliable recorded or constructed flow data which is of adequate length and reliability to allow assessments of natural flow monthly flow percentile values.

Monitoring of flow and water storage conditions to determine which rule that is applicable at any time.

Output produced

A set of flow rules that vary with water supply risk, time of year and current flow conditions

Strengths

The rules acknowledge the benefits to the environment that come from recognition and protection of natural flow variability and provision of flows and managing of volumes stored or taken from the river in a way that reflects the natural situation occurring at the time.

The rules also recognised that the marginal value of additional volumes of stored or diverted water changes with the volume of water currently in storage and the volume of water already being taken.

Weaknesses

The blanket application of set numerical rules such as these is will not produce optimal outcomes.

Requirements to adapt to Viet Nam

Determination of natural flow percentiles at each assessment point.

Suitable for interaction with stakeholders/public etc

The general rational behind rules of the general form of those set as defaults by this approach can be relatively easily explained to stakeholders

Suitability to water planning in Viet Nam

Not suitable for establishing comprehensive environmental flow rules for major storages or regulated rivers.

May be of some limited use in unregulated rivers for setting of flow levels at which pumping for low priority uses was restricted.

The concept that environmental flow rules can vary with the risk to maintenance of supply for essential human uses is one that could be applied to Viet Nam. Several water sharing plans for river basins in New South Wales in Australia also contain rules that vary environmental flow releases from dams with the level of water currently held in storage. Some of the New South Wales rules also relate required dam outflows to dam inflows occurring at the time and the volume of water that can be taken to the volume of flow in the river.

WETTED PERIMETER METHOD

Where developed

USA

Where applied

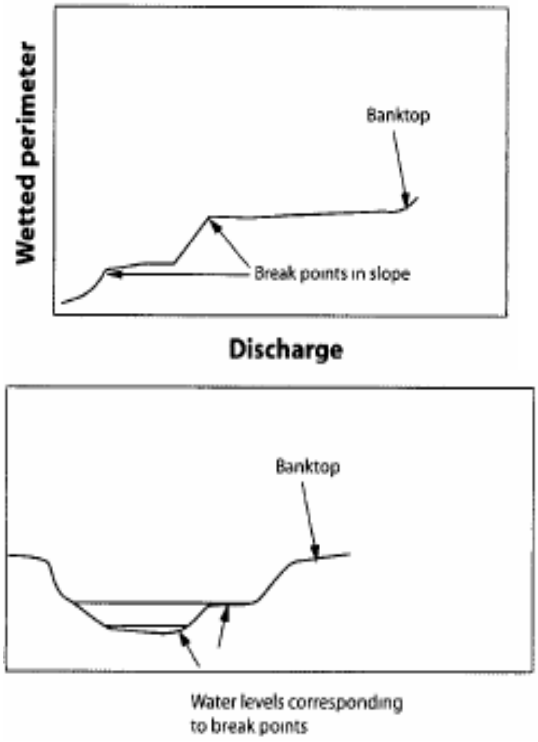
USA and

Description

hydraulic method - prescriptive

The assumption on which this method is based is that the well being of fish or other benthic fauna is a function of the area of habitat available to them and that this related to the wetted-perimeter a river, at those locations that exhibit the greatest habitat area sensitivity to flow reductions. For pool and riffle rivers this is the riffle. Riffles are also important wherever the prime environmental objectives are related to fish because they present a barrier to fish movement at low flow levels.

The relationship between the wetted perimeter and flow is established using cross sections of the river bed and hydraulic calculations or possibly direct measurements of flow. The point at which the increase in wetted perimeter with each unit of increase in flow declines rapidly (the break point) is and indicator of the point at which the complete bed of the river is wetted. This flow, or some proportion of, is taken to be the required environmental flow.



Generally reviewers recommend that the method should only be used in pool and riffle habitats (Armstrong et al 2003) and that the cross-sections be taken in straight reaches of the river on riffles which extend across the river and maintain hydraulic control over a range of flows. The method is said to work best in alluvial rivers, presumably because the cross section shape is less influenced by local geological variations. It is not suitable for use in rivers which have significant sections of unnatural or altered channel. This is because stream-flow requirements determined for natural riffle sites may not be sufficient to protect habitat at sites in a widened channel and may be excessive at sites in an artificially restricted channel; conversely, flow requirements estimated at sites with a narrowed channel may not provide sufficient flows for habitat protection in unaltered stream reaches.

Information required to apply technique

Representative cross sections plus any other information needed to carry out hydraulic calculations necessary to derive flow level versus flow height relationship.

Output produced

A single environmental flow value.

Strengths

No natural flow data is required to derive the flow recommendation.

Relatively low cost but some specialist expertise required to carry out hydraulic calculations.

Weakness

The approach is simplistic and really only relevant to determination of local critical flow levels relating to fish.

It is only applicable to pool and riffle alluvial systems, which are generally smaller rivers and not where the natural river form is unstable or has been significantly altered by gravel or sand mining.

It would be difficult to maintain consistency in selection of cross sections from location to location and accuracy and consistency in calculation of the flow versus height relationship.

Requirements to adapt to Viet Nam

No particular technical difficulties.

Suitable for interaction with stakeholders/public etc

Only in situations where there is general agreement that maintenance of fish movement is of critical importance.

Suitability to water planning in Viet Nam

Not suitable for establishing comprehensive environmental flow rules for major storages or regulated rivers.

This method may have some limited role in assessment of critical flow levels in pool and riffle systems, where maintenance of fish stock is seen to be of particular importance and movement is seen to be the key to their preservation.

R2 CROSS METHOD

Where developed

Colorado USA

Where applied

USA

Description

hydraulic method - prescriptive

The R2Cross method is based similar objectives and assumptions to those of the wetted perimeter approach, namely that maintenance of fish habitat and that this is achieved if flows at riffles are adequate. The R2 cross approach however applies 3 criteria to its assessment of adequacy, namely a minimum water depth, minimum percent of bankfull wetted perimeter and a maximum average velocity. The average depth and, to a lesser extent, the bankfull wetted percent are a function of the stream top width. The average velocity is a fixed value for all stream sizes.

The criteria are not varied with time of year, however the extent to which they are required to be met may be. For example in both Colorado and Massachusetts's applications the only 2 of the 3 criteria have to be met in the season of lowest flow.

The flow versus height relationship and the value applicable to depth, wetted perimeter and velocity at a given flow are calculated using Mannings, HEC or other standard hydraulic methods. Flow measurements and velocity, depth and wetted perimeter measurement could also be used to establish the relationship.

As with the wetted perimeter method, reviewers recommend that the method should only be used in pool and riffle habitats (Armstrong et al 2003) and that the cross-sections be taken in straight reaches of the river on riffles which extend across the river and maintain hydraulic control over a range of flows. The method is said to work best in alluvial rivers, presumably because the cross section shape is less influenced by local geological variations. It is not suitable for use in rivers which have significant sections of unnatural or altered channel. This is because streamflow requirements determined for natural riffle sites may not be sufficient to protect habitat at sites in a widened channel and may be excessive at sites in an artificially restricted channel; conversely, flow requirements estimated at sites with a narrowed channel may not provide sufficient flows for habitat protection in unaltered stream reaches

Information required to apply technique

Representative cross sections plus any other information needed to carry out hydraulic calculations necessary to derive flow level versus flow height relationship.

Output produced

A single environmental flow value.

Strengths

No natural flow data is required to derive the flow recommendation.

Relatively low cost but some specialist expertise and experience required to carry out hydraulic calculations.

Weakness

The approach is simplistic and really only relevant to determination of local critical flow levels relating to fish. The drop from satisfaction of all 3 criteria to 2 criteria in low seasons is arbitrary.

It is only applicable to pool and riffle alluvial systems, which are generally smaller rivers and not where the natural river form is unstable or has been significantly altered by gravel or sand mining.

It would be difficult to maintain consistency in selection of cross sections from location to location and accuracy and consistency in calculation of the flow versus height relationship.

Requirements to adapt to Viet Nam

The relationships between stream top width and other criteria and allowable stream velocity may not be appropriate for fish types in Viet Nam. Review by a fish ecologist would be required.

Suitable for interaction with stakeholders/public etc

Only in situations where there is general agreement that maintenance of fish movement is of critical importance.

Other comments

Suitability to water planning in Viet Nam

Not suitable for establishing comprehensive environmental flow rules for major storages or regulated rivers.

This method may have some limited role in assessment of critical flow levels in pool and riffle systems, where maintenance of fish stock is seen to be of particular importance and movement is seen to be the key to their preservation.

INSTREAM FLOW INCREMENTAL METHODOLOGY - IFIM

PHYSICAL HABITAT SIMULATION – PHABSIM,

RIVERINE HABITAT SIMULATION - RHABSIM

Where developed

USA

Where applied

Widely used particularly in USA also in Canada, Europe, Japan and Brazil.

Description

habitat simulation method – bottom up interactive

The Instream Flow Incremental Methodology (IFIM) was developed by the US Fish and Wildlife Service. IFIM relates changes in flow to changes in habitat availability. Physical data collected from selected sites in the study area are used by the Physical habitat Simulation Model (PHABSIM) to determine factors such as velocity, flow depth and substrata type covered at various flow levels. RHABSIM is a commercially available version of the method which includes additional analysis capabilities.

The methodology provides information about habitat available at different flow levels and under different flow regimes. It will not provide a flow regime recommendation, except in the unlikely circumstances that the only management object is to optimise conditions for a single species. Instead it can provide information about the change in the habitat area that would occur for individual species under different flow conditions. It therefore allows calculation of habitat area changes under different differing management rule and development circumstances, providing of course that flow regime data relevant to the management rules and development levels is available.

The process has generally been used in relation to fish species, but has also been used in relation to invertebrate species and for some broader ecosystem purposes (see Tharme 2003)

The decision about which development and management option is appropriate is still up to negotiation and consideration of socio-economic impacts and also variations in impacts on the various target species.

It is important to recognised that the process does not predict species abundance, only estimates of relative habitat availability.

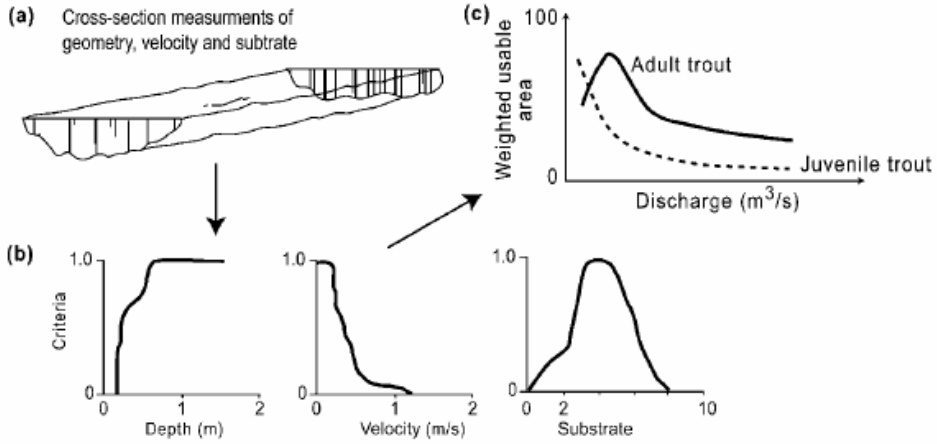
The process requires:

- selection of target species and development of habitat suitability relationships in relation to flow depth, velocity etc – these can be for different life stages of the species,
- identification of representative or critical river sections,
- selection of specific sites for which cross section and other data is to be collected,
- collection of field data,

- hydraulic and habitat modelling using PHABSIM and flow data describing current or expected flow regimes (note this will generally require hydrologic modelling) to produce Weighted Useable Area (WUA) data,
- interpretation of assessment results carried out for alternative management and development combinations,
- presentation of results in a form which is of value to the decision process and decision makers.

Suitability index curves, which describe the likelihood that particular species or life stages of a particular organism will be present for each assessed hydraulic or substrate condition, are essential to the calculation of WUA. These curves can be based on detailed field data concerning the presence of target species in the various habitat types under differing flow depth and velocity conditions. They can also be based on expert opinion if this exists.

The process of WUA calculation is illustrated in the following diagram (Gordon et al 2004)



Field data used to develop suitability index curves should only come from streams where there is little or no flow change, water quality decline or harvesting pressure influence on species presence. It is also important that the field data come from the target river or comparable systems. Where data is taken from other systems it is important that there be no differences in water quality or temperature which may influence species presence and behaviour.

PHABSIM software is free and available from a number of sources including:
http://www.mesc.usgs.gov/products/software/phabsim/phabsim.asp
RHABSIM is available via www.northcoast.com

Information required to apply technique

Ecological data or expert scientific advice that can be used to develop habitat suitability relationships.

Detailed cross section and habitat information from an adequate number of critical and representative sites in the target river.

Output produced

Change in habitat area with changes in the streamflow regime.

Strengths

No natural flow data is required to derive the flow recommendation (although it may be a necessary precursor to development of the flow regimes for various development and management conditions).

The methodology provides data that is more ecologically valid than simplistic single value "minimum flow" methods. The data it provides is also of much greater value as part of the environmental input to determining the optimal trade-off between economic, social and environmental outcomes.

Weaknesses

It is doubtful if there would be many rivers in Viet Nam where the effects of water quality change and harvesting of species has not affected species presence and abundance. It therefore may be difficult to develop reliable habitat suitability relationships for many species of interest to decision makers.

The information requirements involved in IFIM/PHABSIM are extensive and collection is time consuming. This combined with the lack of developed suitability indexes applicable to Viet Nam means that the costs and effort involved in applying the method would probably only be justifiable in connection with large scale, large impact projects.

Considerable expertise is required to apply the methodology.

Changes in water temperature, water quality, nutrient inputs etc that may also result from developments such as dams may render the suitability index relationships which a PHABSIM analysis has used invalid. Existing natural factors such as predator effects or lack of sufficient food may also mean that habitat area is not a reliable indicator of species presence or abundance. This may be because these factors rather than habitat area are limiting fish and other species numbers below the potential carrying capacity, and therefore numbers are insensitive to change in WUA.

One concern of relevance to Viet Nam and referenced in (Gordon et al 2004) is a finding that the relationship between fish biomass and WUA was better in coldwater steams than in warmer streams(Gore et al 1988). It was suggested this was because coldwater streams had simpler ecosystems and more predictable hydrologic regimes.

It has also been suggested (Oliver 1994) that the inherent variability between habitats within a stream reach, render IFIM procedures invalid for whole streams and even whole reaches.

The methodology does not address any of the flow variability factors affecting reproduction, migration etc behaviours of target species or the variability needed to maintain ecosystems.

It does not address geomorphic issues, such as sediment transport etc,

Requirements to adapt to Viet Nam

Development of habitat suitability relationships.

Suitable for interaction with stakeholders/public etc

Provides a better basis for discussion and decision making than simple "take it or leave it" minimum flow recommendations.

Suitability to water planning in Viet Nam

High cost and data needs mean this method is not suitable for broad scale water planning purposes.

Not suitable for analysis of development impacts in the absence of reliable habitat suitability relationships.

Other weaknesses (see above) also mitigate against use of this and other habitat suitability methodologies for any purpose in Viet Nam.

BENCHMARKING

Where developed

Australia

Where applied

Queensland Australia

Description

holistic top-down approach – may be used prescriptively or interactively

The approach provides an assessment of the 'risk' of environmental harm or likely scale of change or a recommendation regarding the range of change that should be permitted.

The study river's current or projected flow regime is described in terms of a set of relevant flow indicators/statistics, each of which is subsequently used to develop benchmarking models linking flow regime change with ecological and geomorphic responses. Information on alterations of natural flow regimes in the subject basin, or from other comparable river systems, is linked with observed ecological and geomorphic impacts. This may be done using existing assessments, observations of experts or by evaluations conducted as part of the assessment process. The approach uses a Technical Advisory panel (TAP) which operates as an expert panel (see later entry in this appendix) and provides advice using the developed relationships between hydrologic change and ecological and geomorphic impacts.

The models are then used to develop a risk assessment framework for evaluation of potential environmental impacts of future WRM scenarios.

Information required to apply technique

A number of sites with a similar natural hydrology, geomorphology and ecology to the portion of river under assessment must exist within the river system or in other comparable river systems.

These sites must be subject to a range of infrastructure development and water extractions which reflects the possible range in the river system being assessed.

Information regarding the hydrologic, ecologic and geomorphic conditions should be available for the benchmark sites so that reliable relationships between changes in flow statistics and the risk or degree of impacts can be developed.

Output produced

Assessments of the impacts likely to result from alteration of the natural flow regime or assessments of the benefits likely to result from flow changes that move the flow regime back toward the natural.

Strengths

The approach can provide advice about a range of possible ecological changes. The method does not require detailed or long-term ecological monitoring at the assessment site.

It allows a range of possible flow management outcomes to be assessed.

Weaknesses

Benchmarking may be affected by 'confounding factors'. These may mean that the assessed state of chosen benchmark sites is not a reliable guide to the future state of the site or river under assessment. These factors could include time lags between hydrologic impacts and the appearance of ecologic or geomorphic changes at benchmark sites. It could also include water quality, land use and fishing pressures differences.

Requirements to adapt to Viet Nam

A set of hydrologic statistics suitable for use in benchmark analysis would need to be developed.

Suitable for Interaction with public

The principle behind the process is easy to understand and is easy to explain to decision makers and to others with an interest in the decisions that are being made.

Suitability to water planning in Viet Nam

Lack of sufficient long-term ecologic data and the existence of many 'confounding factors' limits the usefulness of this approach in Viet Nam.

Further local expert assessment may however be worthwhile to determine whether there is sufficient data for a range of development levels in some river types to allow the approach to be of value. One possible example may be the short unregulated coastal river systems of central Vietnam.

EXPERT PANEL ASSESSMENT

SCIENTIFIC PANEL ASSESSMENT

Where developed

Australia

Where applied

Australia

Description

approach – may be bottom up or top down, may be used prescriptively or interactively

Experts from a range of disciplines are engaged to make environmental flow recommendations or assess the benefits or effects of flow management options. The individuals can come from any relevant scientific discipline but should include both geomorphic and ecological experts.

If the panel has been engaged to make flow recommendations, it is important that they be provided with good advice regarding the river management practicalities. It is also important that good hydrologic advice be available, preferably in the form of statistical assessments relevant to each of their disciplines.

The individual panel members are generally permitted to choose the type of analysis, relevant to their area of expertise, which they undertake. The process may involve field inspections and assessments, if time and finances permit or it may be carried out as a desktop process. It may also include meetings between the Panel and outside experts or stakeholders.

The Panel then discusses and debates the opinions of panel members until a consensus is reached regarding the assessment of flow management options or environmental flow recommendations.

It is important that Panels be permitted to provide objective scientific advice and that they are not required to make tradeoffs between environmental and social or economic outcomes. The Panel members must also act as scientific experts and must not be to be required or allowed to become advocates for particular organisations or interest groups (Cottingham et al 2001).

Information required to apply technique

Where Panels are being asked to develop environmental flow recommendations it is essential that there be a clear definition of the environmental and river health outcomes that are being sought.

The expertise of the Panel must match the issues or questions it is being asked to address. The more general the questions and broader the issues the greater the range of expertise required.

Panels require hydrologic, hydraulic, geomorphic and ecological information and data relevant to the analysis they need to carry out to make recommendations.

Output produced

This can range from specific recommendations about flow regimes to assessments of the impact of alternative management options.

Strengths

The process allows consideration of a wide range of ecological impact areas to be considered, for their interactions to be considered and for an integrated set of assessments or recommendations to be developed. It allows individual experts to choose the assessment methodology which best suits their scientific discipline and the data which is available or can be made available within the permitted timeframe.

Weaknesses

The expertise and personalities of individuals who make up a Panel will affect the advice it provides. Because of this two Panels may produce quite different recommendations (see Bishop 1996) with biases that reflect the expertise of the participants or the dominance of individual personalities on the Panels.

Lack of adequate data will affect the reliability of Panel advice.

Reliable assessments may take time to complete (6 to 12 months in Australia) , in part because of the practical problems involved in gathering the required experts together but also because of the time needed to gather data and for individual experts to carry out analysis prior to or subsequent to Panel meetings.

Requirements to adapt to Viet Nam

Panel processes which are sensitive to local social or other circumstances would need to be devised.

Improvement of data and information exchange between agencies would assist expert panel processes.

Hydrologic modelling and assessment capabilities would need to be improved.

Suitable for interaction with stakeholders/public etc

Panel members may be willing to explain their recommendations to decision makers and stakeholders; however it is important that such interactions not be permitted to become forums in which Panel members are pressured into adjusting recommendations.

Other comments

The Building Block Methodology and Downstream Response to Imposed Flow Transformations approaches also use expert panels.

Suitability to water planning in Viet Nam

The process places high demands on data and on the availability of experts who are willing to provide opinions for which there might not always be clear supporting evidence.

However expert panel processes, do provide a means by which the knowledge that is available can be brought together and synthesised in a reasonably efficient manner to provide flow recommendations.

BUILDING BLOCK METHODOLOGY (BBM)

Where developed

South Africa

Where applied

South Africa and Australia

Description

holistic approach – bottom up- prescriptive (although multiple use can assist interactive discussions)

This is a structured process for development of a flow designed to meet a predetermined outcome.

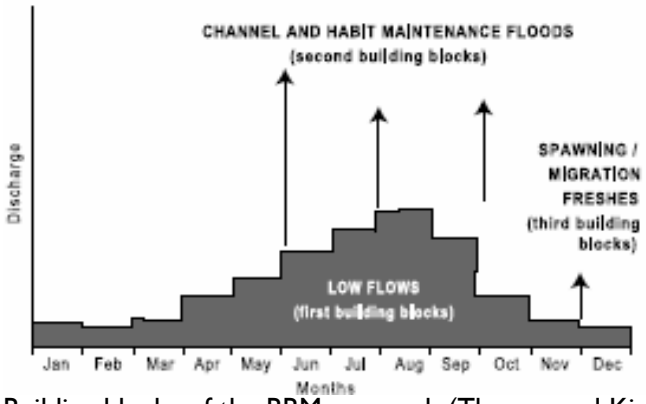
The presumptions upon which BBM is based (Arthington 1998b) are:

- plants and animals associated with a river can cope with low flow conditions that occur naturally often occur
- plants and animals may require higher flow conditions that occur at certain times
- if the most important characteristics of natural low flows and high flows are incorporated into a modified flow regime this will assist in maintaining these plants and animals and natural river processes, and
- certain flows influence channel geomorphology and there inclusion will aid maintenance of natural channel structure and therefore maintenance of the natural diversity of habitats.

The initial phase of the process involves a planning meeting, followed by gathering of hydrologic, hydraulic, ecological and other relevant field data. This is used to produce an initial "Starter Document". The starter document provides background information for the experts who will participate in subsequent phases of the process as well as providing a background document which can serve as a reference at future times.

The second phase involves a major workshop. This is attended by water managers and engineers involved in design and management determinations as well as scientific experts from relevant disciplines (ecology, geomorphology etc). The workshop then builds a recommended flow regime designed to meet a desired future long-term river condition.

Flow regime decisions are made for reach month. The flow regime is built up from a monthly base flow plus special purpose higher shorter period flows (see diagram below taken from Gordon et al 2004). Proponents of particular levels or frequencies of flow are required to state their reasons. The workshop then discusses the proposals until a consensus recommended flow regime is reached.



Building blocks of the BBM approach (Tharme and King 1998)

The third phase requires the linking of the environmental flow recommendations to the development and water management decisions being made in relation to the river system. This involves comparison of projected flow outcomes for different development or management options with the flow recommendations that have been made.

Information required to apply technique

Hydrologic, hydraulic and ecological information is required. Experts able to cover the required range of disciplines must also be available.

Output produced

A flow regime that is assessed to be capable of achieving a desired river health outcome. If several outcomes are nominated then several flow regime recommendations can be provided.

Strengths

The method provides an efficient and structured way of converting ecological understandings into flow regime recommendations.

The clear documentation of the process each time it is applied which can then assist in achieving more consistent results, improving the process and dissemination of information relevant to local flow management and development.

Experience gained in application of the process in South Africa has identified a variety of ecological knowledge gaps. This has lead to a range of medium to long-term projects designed to improve the methodology.

This may in fact be a side benefit of this process, and also the DRIFT process, in that it helps identify critical information and data gaps and focus research on issues of immediate concern and value to management decisions.

Weaknesses

It is very difficult to define a desired future state of the system in a way which is objective and has the same meaning to all workshop participants. There is also a temptation when describing an environmental outcome to aim unrealistically high.

The success of the approach (and all others that require expert panel input) also depends on the availability of experts with a good understanding of the plants, animals and processes occurring in the river system. It is unlikely that these will be readily available in most areas of Viet Nam.

Variations in the range of information and data available to experts in different disc and dominance by individual participants in the workshop processes may bias conclusions.

Requirements to adapt to Viet Nam

Panel processes which are sensitive to local social or other circumstances would need to be devised.

Improvement of data and information exchange between agencies would assist expert panel processes.

Hydrologic modelling and assessment capabilities would need to be improved.

Suitable for interaction with stakeholders/public etc

The process provides a good deal of information that could be of value in public discussion of flow management proposals and for discussions with decision makers.

Suitability to water planning in Viet Nam

The process places high demands on data and on the availability of experts who are willing to provide opinions for which there might not always be clear supporting evidence. However this approach, like other expert panel processes, does provide a means by which the knowledge that is available can be brought together and synthesised in an efficient manner to provide flow recommendations.

However, the third phase in the process is cumbersome and it is not really suitable for use in assessments involving a range of possible options is limited.

Its dependence on a clearly definition of desired outcome prior to commencement of assessments would also often limit its usefulness.

FLOW RESTORATION METHODOLOGY

Where developed

Queensland, Australia

Where applied

Australia

Description

framework – top down - interactive

The Flow Restoration Methodology designed to analyse how an existing regulated flow regime could be modified to restore some of the natural characteristics of a river (Arthington 1998b). It involves an assessment of the current impacts of flow regulation and preparation of a report. A workshop process is then used to identify possible environmental flow options and likely benefits. These are then computer modelled and the implications for yield of the system assessed. The results are reviewed, along with assessment of any required infrastructure changes or complementary management actions.

The approach is similar to that undertaken in the Australian state of New South Wales as part of the process for design of environmental release rules for existing major dams throughout the state. The process used in New South Wales was however not as structured or exhaustive as that applied in the Queensland case.

Information required to apply technique

Information on the current state of health of the river and its associated ecosystems.

Hydrologic information on the impacts of river regulation on the flow regime and the low regime consequences of proposed management rule changes.

An understanding of the relationship between changes inflows and the consequences for various ecosystems.

Output produced

Information on possible river health benefits and impacts on the yield and reliability of the dam and supply system.

Strengths

The approach illustrates how holistic approaches can be used to assess options for adjusting operation of dams and water supply deliveries to improve environmental outcomes downstream.

See “Expert Panel Assessment” for further possible strengths.

Weaknesses

The success of the approach (and all others that require expert panel input) depends on the availability of experts with a good understanding of the plants, animals and processes occurring in the river system. It is unlikely that these will be readily available in most areas of Viet Nam.

See "Expert Panel Assessment" for further possible weaknesses.

Requirements to adapt to Viet Nam

See "Expert Panel Assessment"

Improvement of data and information exchange between agencies would greatly assist the process.

Hydrologic modelling and assessment capabilities would need to be improved.

Data and research to support the development of basic understandings regarding the links between flow change and river health outcomes.

Suitable for interaction with decision makers/ stakeholders/public etc

The processes used in Queensland and New South Wales provide information regarding expected river health and system yield impacts that are useful in discussions with stakeholders. The yield impacts can also be used in determinations of the economic consequences of alternative management changes.

Suitability to water planning in Viet Nam

The analysis involved is not as structured as that which occurs under DRIFT and therefore outcomes may not be consistent, it also does not include any assessment of social impacts and relies on subsequent assessments to turn changes in yield into economic outcomes. However the detailed and highly structured DRIFT approach is probably not efficient for assessment of flow restoration alternatives. This is because the range of possible alternatives is often limited by infrastructure considerations or the acceptable level of impact on system yield.

DOWNSTREAM RESPONSE TO IMPOSED FLOW TRANSFORMATION - DRIFT

Where developed

South Africa

Where applied

South Africa

Description

framework – top down - interactive

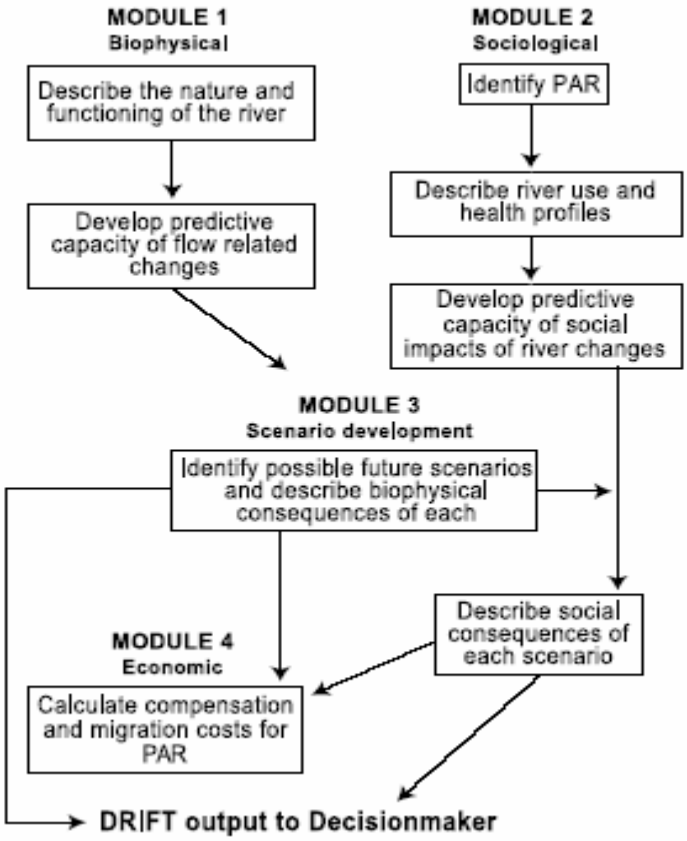
The assumption upon which DRIFT is built (Brown and King 2000) is that different features of the flow regime produce different ecologic and geomorphic reactions and therefore a decrease (or increase) in that one feature will produce different outcomes than a change in some other feature.

DRIFT is a very structured process by which:

1. the natural (or existing) flow regime is analysed to provide a set of standard flow statistics which cover low flows and high flows/floods, the time of year in which they occur and for floods the number, volume and duration of events in each size class,
2. these statistics are then linked to cross-sections of the river at a number of representative sites,
3. a standard set of reductions (or increases) in each flow statistic is then assumed and the ecologic, geomorphic and water quality impact of each these is determined and entered into a database,
4. the hydrologic statistics that would result from possible development or management scenarios are then calculated and the differences between these and the natural (or current) flow regime assessed,
5. the results of step 3 are then combined with the ecological, geomorphic and water quality impacts predicted under step 3 to provide a projected future river condition,
6. this is then used to identify the likely social impacts of each scenario on Persons at Risk (PAR) and a compensation or mitigation cost is calculated,,
7. the water or electricity yield that can be produced is also calculated, and
8. the river condition, social impact and water and/or electricity production outcomes are then fed into the forum or arms of government responsible for making management or development decisions.

The DRIFT process generally requires at least 2 workshops, one to deal with the bio-physical issues and the other to resolve socio-economic issues. However, these workshops do not require consensus agreements to be reached as the process allows for uncertainties regarding impacts to be included in process outputs.

The diagram below (taken from Gordon et al 2004) shows how the DRIFT activities interact:



Information required to apply technique

Reliable and reasonably long term flow data (20 years plus) is required to provide a complete set of hydrologic statistics.

Hydraulic information (cross-sections etc) must be collected from representative sites.

Available ecological information must be gathered and any deficiencies that can be filled in by gathering of data prior to determination of

Output produced

Projected river condition, economic and social impacts of possible development and/or management scenarios.

An impacts database which can then be subsequently used to assess the impacts of alternative scenarios.

Strengths

The DRIFT method has all of the strengths of the BBM approach, namely:

- it is an efficient and structured relating flow regime change to ecological impact,
- there is clear documentation of the process each time it is applied which can then assist in achieving more consistent results, improving the process and dissemination of information relevant to local flow management and development decisions,
- it will help to identify critical information and data gaps and focus research on issues of immediate concern and value to management decisions

Because it is a top-down process it doesn't depend on clear and specific definition of desired outcomes (often an impossible task and a weakness of BBM). This makes it a useful in circumstances where the question is how to optimise outcomes resulting from a possible range of alternatives.

The framework explicitly incorporates assessment and quantification of impacts on those who depend on the river for provision of household services such as water supply, food sources etc, a very important consideration in Viet Nam.

Once the DRIFT relationships between flow regime change and consequences are developed, the consequences of any number of future flow regimes arising from potential management or development scenarios can be assessed quickly and in a consistent fashion without a requirement to reconvene experts or conduct new studies. Because of this, the process facilitates resolution of questions such as how to get the best river health and socio-economic benefits for a given tolerable change in water yield or hydro-electric production which often requires assessments of a large number of possible management options.

It allows prediction uncertainties to be recognised and incorporated into the information provided to decision makers.

Weaknesses

The success of the approach depends on the availability of experts with a good understanding of the plants, animals and processes occurring in the river system and the availability of suitable data.

Variations in the range of information and data available to experts in different disc and dominance by individual participants in the workshop processes may bias conclusions.

It is relatively time consuming and requires a wide range of data

Requirements to adapt to Viet Nam

Workshop processes which are sensitive to local social or other circumstances would need to be devised, however, as there is no requirement for consensus this should not be the issue it is in more usual expert panel processes.

Improvement of data and information exchange between agencies would greatly assist the process.

Hydrologic modelling and assessment capabilities would need to be improved.

Data and research to support the development of basic understandings regarding the links between flow change and river health outcomes.

Suitable for interaction with decision makers/ stakeholders/public etc

The process provides detailed impact projections and brings river health, social impact and economic assessments together in a single package that should be useful for discussions with all parties.

Suitability to water planning in Viet Nam

For the reasons outlined under "Strengths the DRIFT framework and processes would be very suitable for adoption in relation to major development and management decisions, particularly those where there are several possible options.

This approach, and other Holistic approaches, should not be seen as substitutes for the gathering of good ecological information and other data, rather they should be viewed as a means of making the best use of what is available. It is important that action be taken to deal with information or data deficiencies identified in the process of applying DRIFT, or any other holistic approach so that future applications of such approaches have a better knowledge foundation.

Appendix 3 – Comparison of results of "minimum flow" methods based on data in Armstrong et al 2004

Location	Wetted perimeter		R2Cross 3 of 3			R2Cross 2 of 3			Tennant Method					
									50% maf excellent		30% maf "fair"		10% maf "poor"	
	flow l/sec/km2	nat flow %ile	flow l/sec/km2	nat flow %ile	as % of wetted perimeter	flow l/sec/km2	nat flow %ile	as % of wetted perimeter	flow l/sec/km2	as % of wetted perimeter	flow l/sec/km2	as % of wetted perimeter	flow l/sec/km2	as % of wetted perimeter
Squannacook R, MA	3.8	79	5.9	68	154%	3.0	86	77%	9.7	254%	5.8	151%	2.0	51%
Beaver Brook, NH	1.4	88	4.3	74	300%	2.2	85	154%	8.7	615%	5.0	354%	1.7	123%
Old Swamp River, MA	5.2	75	18.6	34	354%	3.2	84	60%	11.1	213%	6.7	127%	2.2	42%
Wood River, RI	3.6	95	8.0	77	221%	5.4	87	148%	11.9	330%	7.1	197%	2.4	67%
Mt Hope R, CT	5.2	70	6.8	65	129%	3.8	76	73%	9.9	190%	6.0	115%	2.0	38%
Little River, CT	4.4	82	10.5	57	240%	4.0	85	93%	10.4	238%	6.2	143%	2.1	48%
South River, MA	3.1	92	10.1	60	329%	7.9	68	257%	11.9	389%	7.1	232%	2.4	79%
Green R, Colrain, MA	6.3	72	23.0	29	362%	9.3	62	147%	11.9	188%	7.1	112%	2.4	38%
Sevenmile River, MA	4.3	75	4.3	74	100%	1.7	88	41%	9.5	223%	5.7	133%	1.9	44%
Green R– Will'town, MA	3.5	86	9.2	62	263%	4.6	61	131%	10.5	300%	6.3	181%	2.1	59%
Median	4.0	81	8.6	64	251%	3.9	85	112%	10.4	246%	6.3	147%	2.1	49%
Average	4.1	81	10.0	60	245%	4.5	78	1.2	10.6	294%	6.3	175%	2.1	59%

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Clean Ganga
Campaign for a Clean Ganga
|| SWATCHA GANGA ABHIYAAN ||

CIVIL SOCIETY PARTNERSHIP PROGRAM

.... promoting democratic values & articulating voice of the voiceless!

S U P P O R T E D B Y

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Log No.: FOC\05\12
Project No.: 30418
Task No.: 130
Grant No.: 007
Fundware No.: 30-17701(3)

Close Out Report
October 2005

Sankat Mochan Foundation

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14th October 2005

Sushri Dinesha deSilva Wikramanayake
The Asia Foundation
3/1 Rajakeeya Mawatha
(Racecourse Avenue)
Colombo 7, Sri Lanka

Dear Sushri Dinesha ji,

Enclosed is the close out report for the third The Asia Foundation grant period 2004 – 2005 for the Civil Society Partnership Program at the Sankat Mochan Foundation, Varanasi.

With The Asia Foundation involvement in the program drawing to a close, may I take this opportunity to thank each and every one of your colleagues for their kindness and guidance these past three years. Together, we have seen the germination of more knowledgeable civil society governance in the holy city that is charged with the enormous undertaking of dealing with the fate of the declining River Ganga. The Campaign for a Clean Ganga itself has spread beyond our city to the national stage — thanks in part to TAF support.

I hope you will have the occasion to visit us again, here at Tulsi Ghat.

Again, my heartfelt thanks.

Sincerely,

Dr Veer Bhadra Mishra
President
Sankat Mochan Foundation

14th October 2005

Ms Dinesha deSilva Wikramanayake
The Asia Foundation
3/1 Rajakeeya Mawatha
(Racecourse Avenue)
Colombo 7, Sri Lanka

Dear Dinesha,

Mahantji has put it so well. There is little more to say, except to also express my thanks for your dedication and support for this project these past three years.

The Asia Foundation support came at a crucial period, and in my opinion has paid off in terms of slowly improving municipal governance conditions in Varanasi – starting at an extremely low level – and the national takeoff of the *Swatcha Ganga Abhiyaan* (Campaign for a Clean Ganga).

Our work is by no means over. But perhaps we have reached the end of the beginning?

Thanks once again!

Sincerely,

Amitayush Vyas
Civil Society Partnership Program
Sankat Mochan Foundation

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Close Out Report: October 2005
Civil Society Partnership Program (CSPP)
Sankat Mochan Foundation (SMF), Varanasi, India
Log No.: **FOC\05\12**
Project No.: **30418**
Task No.: **130**
Grant No.: **007**
Fundware No.: **30-17701(3)**

"India faces a turbulent water future. Unless water management practices are changed — and changed soon — India will face a severe water crisis within the next two decades and will have neither the cash to build new infrastructure nor the water needed by its growing economy and rising population.

Sewage and wastewater from rapidly growing cities and effluents from industries have turned many rivers, including major ones, into fetid sewers. Massive investments are needed in sewers and wastewater treatment plants to protect people's health and improve the environment."

India's Water Economy: Bracing for a Turbulent Future
A Draft World Bank Report
By John Briscoe, The World Bank Country Director for Brazil & Senior Water Adviser for South Asia
Released in New Delhi on 5th October 2005

http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/INDIAEXTN/0,,menuPK:295589~pagePK:141159~piPK:141110~theSitePK:295584,00.html

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1.0 EXECUTIVE SUMMARY

A remarkable agreement was signed in June 2002 between The Asia Foundation (TAF), Regional Office, Colombo, Sri Lanka, and Sankat Mochan Foundation (SMF) in Varanasi, India.

In this agreement, an initial 12-month grant of USD 25,000 was awarded to SMF to promote heightened community awareness, participation and action to deal with the severely polluted River Ganga. An additional grant of USD 11,000 extended the program for a further 12 months, to 30th September 2004. Further, the program was extended till 30th September 2005 with a final grant of USD 11,000.

TAF grants were all made with concurrence from the United States Agency for International Development's (USAID) United States–Asia Environmental Partnership (US-AEP) program at the American Embassy in New Delhi.

In addition, the British High Commission in New Delhi granted the sum of GBP 3,000 (about USD 5,000) in the fourth quarter of 2005, and the Public Affairs Section of the U.S. Department of State, American Embassy, New Delhi, granted USD 5,804.60 in the same quarter towards Clean Ganga Day 2005 New Delhi.

Public Affairs Section of the U.S. Department of State, American Embassy, New Delhi

This close out report of the 2004 - 2005 grant period summarizes the status of the project, called Civil Society Partnership Program (CSPP), for the months of August and September along with a three-year program overview.

During the grant period, the project consisted of continued municipal governance capacity building for municipal corporators and others in Varanasi; Clean Ganga Day 2005 on 15th September in New Delhi, an all-day public event that included a top-level river

seminar, student manifestations; two Ganga-themed cultural evenings on 14th and 15th September; a "Distressed River Ganga" photographic exhibition at the India Habitat Centre from 13th to 15th September, and a "Healing the distressed Ganga" corporate luncheon and business leaders' consultations on 16th September at the British High Commission in New Delhi with support from US-AEP Bangkok and US Commercial Service, New Delhi. The website "www.cleangangaday.in" was set up in August to increase public interest and also to act as repository for considerable documentation about Ganga.

The various Clean Ganga Day events amounted to a breakthrough of sorts for the Campaign. Media coverage was brisk and communications specialists have noted that the Clean Ganga Day is now the only firmly established "brand" for the cause of Ganga. Meantime, The Office of the Prime Minister of India, with an understood go-ahead from Shrimati Sonia Gandhi, Chairperson of United Progressive Alliance — the ruling coalition in India; and National Advisory Council — the "super cabinet", requested summaries about the Ganga seminar on September 15 and the corporate workshop the following day. Arun Bhatnagar, Secretary, National Advisory Council, is forming a committee to review the proposals put by Sankat Mochan Foundation regarding Ganga cleanup in Varanasi. Further, Arun Bhatnagar informed the CSPP team that the National Advisory Council on 19th April 2005 has put forward recommendations to the Union Cabinet after bearing in mind the views expressed at Clean Ganga Day 2004 New Delhi regarding empowerment of urban local self-government institutions (LSGIs). The recommendations include:

1. Urban local self-governments should own, manage, monitor and control all new programs and missions

2. The bilateral and multilateral funding agencies may be advised that their support for projects related to the functional domain of local governments as envisaged in Schedule XII of the Indian Constitution has to be contingent upon implementation through elected local governments

3. All state legislations regarding 73rd and 74th constitutional amendments, which do not conform to the Indian Constitution, should be repealed. Citizens must be advised to invoke Writ jurisdiction in the higher judiciary

4. The district tier of the local self-governments should represent the interests of both rural and urban populations of the district

5. The Union and state governments should put in place and implement a comprehensive training and capacity building program for elected representatives of the urban local self-government institutions. External expertise should be sought liberally for carrying out these programmes

In addition there was another welcome development. The Government of India was very well represented at this Clean Ganga Day; the seminar was attended by S K Panigrahi, Director, Environment, of the Planning Commission; and senior bureaucrats from National River Conservation Directorate (NRCD) of the Ministry of Environment and Forests - Lalit Bokolia and Dr K C Rathore; and Manjit Singh and Dr Lalim from Yamuna Action Plan (YAP).

Further, a local Delhi NGO — YouthReach, in association with Government of National Capital Territory of Delhi, wants to emulate the Clean Ganga Day model for its Clean Yamuna Day, starting this year onwards. SMF will guide YouthReach to hold Clean Yamuna Day.

Political interest was evidently triggered by public statements issued by the American Ambassador and also the British High Commissioner who both praised the work of the Campaign in our quest for sustainable solutions for the Ganga.

British High Commissioner Sir Michael Arthur KCMG, who spoke at both the seminar and the workshop, said Britain "was proud to join our partners in USAID, US-AEP and The Asia Foundation in that support." He publicly stated his country would continue to morally and materially support the Campaign.

At the heart of the Campaign is the fact that the Indian state water apparatus is lackadaisical, ineffective and indifferent, and lacks a driving interest in environmental quality.

The World Bank is now driving this message home. In a draft report issued on 5th October, the Bank said that India faces a turbulent water future unless dramatic changes are made, and made soon, in the way in which the government manages water.

The Bank is set to increase its loans to India for water-related sectors and plans to bring knowledge about international good practice to bear. As things stand, "the Indian state water apparatus still shows little interest in the key issues of the management stage: participation, incentives, water entitlements, transparency, entry of the private sector, competition, accountability, financing and environmental quality."

2.0 THREE-YEAR PROGRAM OVERVIEW

The Sankat Mochan Foundation (SMF) in Varanasi "has brought the plight of the despoiled Ganga to the attention of the world," as *Time* magazine once put it. The first year of the grant, in 2002-2003, augmented the capabilities of SMF in order to expand its Campaign for a Clean Ganga nationwide, including the nation's first-ever Clean Ganga Day, held in Kolkata (Calcutta). Numerous workshops and lectures across the Ganga Basin were conducted during this period.

At the outset, networking was vital in order to enhance SMF's capabilities. Networking directed its energies toward identifying and cooperating with likeminded organizations and individuals who share our concern about the fate of the Ganga and other Indian rivers.

During the first grant period CSPP established relationships with some 50 parties that include other NGOs, businesses, educational institutions and private individuals, both at home and abroad.

By the end of the first period, relationships ranged from the Indian National Trust for Art and Cultural Heritage (INTACH) to the Trustees of Pomona College in the US, and included closer interaction with our long-established Friends of the Ganges chapter in San Francisco, as well as the nascent chapter in London. New partners were gradually added during the three-year grant period. They now include The Times Foundation, K.K. Jojodia Foundation, Art of Living Foundation, International Goodwill Society of India, Development Alternatives, Swechha Foundation —

Photography Arts Association of India

We for Change & We for Yamuna, Delhi Public School Society, India Habitat Centre, YouthReach and the Photography Arts Association of India (PAAI).

At the political level, we commenced interaction with municipal corporations in Ganga Basin cities such as Kanpur and Allahabad, in addition to enhanced interaction with the Municipal Corporation at our home base in Varanasi. In a sense, Varanasi is the model for municipal corporations elsewhere in the Basin: It is the only municipal corporation that is asserting its mandated environmental rights.

The first grant period was therefore crucial in laying the groundwork for the remaining two years of TAF support. It saw many tertiary activities, including translation into Hindi of Ganga-related articles extracted from our former website "www.cleanganga.com" — and their subsequent publication — and production of Hindi language newsletters showcasing the activities of the Campaign. Other promotional materials included Clean Ganga posters targeted in particular to municipal corporators, including those who are illiterate.

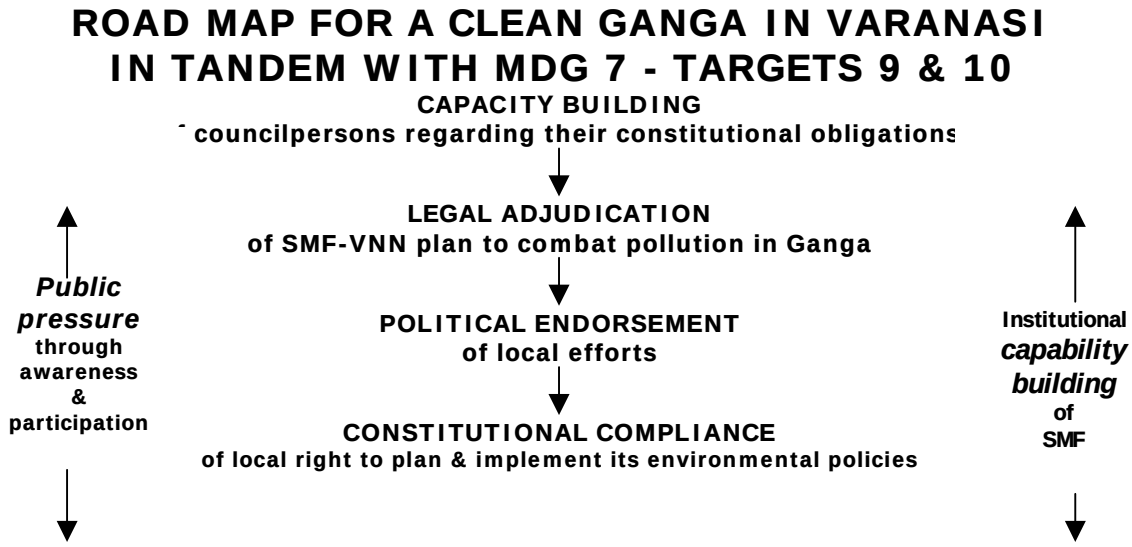
During the second year of grant activity, 2003-2004, SMF focused attention on activities within Varanasi municipality and in New Delhi, where the second annual Clean Ganga Day was staged.

Throughout the entire three years of the program, capacity building of municipal corporators in Varanasi was pushed forward unabated. It is important that municipal corporators fully understand their legal rights in the Indian Constitution. It gives municipalities the mandate to determine environmental policy, among other things. SMF over the years has been working for *constitutional compliance* so that the municipal corporation can fulfill its constitutional obligation towards the citizens of Varanasi and River Ganga.

Since the Uttar Pradesh Government has usurped these rights, a court case supported by SMF is underway to obtain *legal adjudication* to implement the SMF-backed non-electrical sewage treatment solution with gravity interception and diversion to clean the 7 km river stretch in the holy city.

Public pressure, civic capacity building, legal adjudication and *political endorsement* will pave the way for *constitutional compliance* of local

civil society rights in Varanasi. This scenario can lead to Union Government's prioritization of a Ganga cleanup nationwide in tandem with local needs, aspirations and conditions. Simultaneously, it calls for the *institutional capability building* of SMF to undertake and achieve these crucial goals, which are in fact cornerstones of 'effectiveness of civil society discourse' for our nation in the context of *constitutional compliance* of democratic decentralization for efficient environmental management.



2.1 Objectives in 2004-2005

SMF objectives remained straightforward, and are also in accordance with Millennium Development Goals (MDGs) and Johannesburg Summit Goals:

1. *To bring various civil society actors together to create public pressure to secure a clean Ganga for future generations*

2. *To build capacities of various civil society actors for successful articulation and adoption of sustainable development goals at local and national levels, promotion of grassroots democracy, enabling of good governance and protection of human rights*

3. *To mobilize civil society support to encourage the Government of India to prioritize the issue of Ganga pollution, and advocate enhanced financial and technical resources to achieve this; and sustain the Campaign for a Clean Ganga program*

4. *To continue the on-going dialogue and colloquy with Varanasi municipal corporators and support their efforts at gaining a better understanding of their rights and responsibilities under the 74th Amendment to the Indian Constitution, granting environmental authority to the municipalities*

5. *To help articulate the citizens' and urban LSGIs concerns and aspirations in order to create public pressure on state and its instrumentalities to adopt appropriate and sustainable technology for pollution abatement*

2.2 Engagements in 2004-2005

Specific engagements were:

1. Ongoing onsite capacity building; and a three-day corporators' conclave (*Sabhasad Sangam*) for members of Varanasi Municipal Corporation which included the following:

   I. Symposium: People's Participation in Urban Development and Planning in the context of 74th Amendment to the Indian Constitution — 30th September

   II. Symposium: Fraudulence in Constituency Delimitation and Reservation in the context Urban Local Self-Government Elections — 1st October

   III. Symposium: Relevance of Gandhian Philosophy in Contemporary Society — 2nd October (Birth Anniversary of Mahatma Gandhi)

2. Clean Ganga Day 2005 New Delhi: 15th September

   I. Website: www.cleangangaday.in

   II. Photographic Exhibition: The Distressed River Ganga at the Palm Court Gallery, India Habitat Centre, 13th to 15th September

   III. Cultural Evening: Ganga Rhythms at the Amphitheatre, India Habitat Centre, 14th September

   IV. Seminar: Healing a Distressed River at the India International Centre, 15th September

   V. Seminar Volume: Healing a Distressed River, expected in January 2006

   VI. Student Manifestations: Clean Ganga Now! at the India International Centre, 15th September

VII. Cultural Evening: Ganga Rhythms at Triveni Kala Sangam, 15th September

3. A Civil Society Engagement Workshop in New Delhi with business corporates to include pollution in Ganga in their Corporate Social Responsibility Agenda (CSR): Corporate Luncheon and Business Leaders' Consultation at the British High Commission, New Delhi on 16th September

4. Lecture tours in Britain and Sweden and international publicity

These engagements concretized the priorities as stated by The Asia Foundation: to once again encourage the Government of India to prioritize the issue of Ganga pollution through events like Clean Ganga Day 2005 New Delhi; and find ways to sustain the Campaign for a Clean Ganga through various civil society engagement workshops and symposia; as well as further increase the capabilities of the local municipal corporators so that they can implement reasonably sound choices to contain Ganga pollution in Varanasi. These events reinforced SMF's space in the politico-environmental discourse of the nation while solidifying SMF's premier position as the sole Ganga River organization that offers technically and financially sound alternatives for pollution abatement—instead of just talk.

The *raison d'être* for these events is to inculcate a sense of social responsibility among various civil society actors, a responsible media and an accountable political class in order to marshal urgent affirmative action to clean Ganga in Varanasi. Sub-themes include Ganga as an environmental concern, scarcity of clean water, health impact of water pollution, protection of democratic polity.

And, as well, constitutional rights and obligations at the grassroots level, conserving our cultural heritage, safeguarding human rights by articulating the desire for a clean Ganga by the citizens of the holy city, securing a role for the voluntary sector in nation building through public-private partnership, and pressing adoption of sustainable and appropriate technology to ameliorate the Ganga from its present decline.

3.0 ACTIVITIES

The overriding objective in 2004-2005 was to again encourage the Government of India to prioritize Ganga pollution. This must be supplemented "by broad support from people living in the Ganga Basin," as Robert O Blake, Jr, the Deputy Chief of Mission at the American Embassy in New Delhi, stated last year at Clean Ganga Day.

This objective found expression in four main projects:

1. Ongoing onsite capacity building; and a three-day corporators' conclave (*Sabhasad Sangam*) for members of Varanasi Municipal Corporation

2. Clean Ganga Day 2005 New Delhi: 15th September

3. A Civil Society Engagement Workshop in New Delhi with business corporates to include pollution in Ganga in their Corporate Social Responsibility Agenda (CSR): Corporate Luncheon and Business Leaders' Consultation at the British High Commission, New Delhi on 16th September

4. Lecture tours in Britain and Sweden and international publicity

3.1 Ongoing onsite capacity building; and a three-day corporators' conclave (*Sabhasad Sangam*) for members of Varanasi Municipal Corporation

Municipal capacity building efforts continued for the 100 members of the Varanasi Municipal Corporation and other stakeholders. This core program spanning three years aimed at improving their understanding about their own roles and responsibilities in accordance with the 74th Amendment to the Indian Constitution — that gives broad powers to municipalities. Dr Veer Bhadra Mishra, president of SMF, and field coordinator Shri Rana Mani Tiwari on the SMF staff, spearhead the program.

3.1.1 Ongoing onsite capacity building program for municipal corporators of Varanasi

Our capacity building exercises with some 100 members of the Varanasi Municipal Corporation (*Varanasi Nagar Nigam*) is a core program that evolved over the years through process learning. It has received significant impetus through CSPP. The capacity building exercises extend into the village *panchayats* adjoining Varanasi and Sarnath.

These exercises assume a unique dimension because SMF is engaged in a public-private partnership with the Corporation. Value-added knowledge, information dissemination, appreciation of mutual problems and continuous support to realize the rights granted under the Constitution make our capacity building exercises more of counseling sessions in professional and personal empowerment of municipal corporators.

A typical field session consists of six to ten participants of which at least half are councilpersons, and the rest are other members of civil society such as members of clubs, associations, trade unions, educational institutions, individual citizens etc. who have a direct stake in a clean Ganga in Varanasi. Shri Rana Mani Tiwari, our Field Coordinator, assumes the role of the 'Master Trainer'. Dr V B Mishra's inputs are available to Shri Tiwari at all times. Interestingly, these sessions are held at any conceivable place: the canteen at the Corporation office or the only park across from the Corporation office, at a tea stall, at ward offices and sometimes in our offices.

Although bottom-up approach of urban governance was institutionalized with the 74th Constitutional Amendment in 1994, it is not yet realized because of two reasons: one, information asymmetry, that is, elected municipal corporators are still ignorant of their rights and duties; and two, absence of any 'disempowerment' mechanism for the high-end and medium-end ruling political class and permanent executives so that they voluntarily devolve power to the low-end political class, that is, the municipal corporators. Evolving a proper 'disempowerment' mechanism is a tough road. Better to focus on enabling the municipal corporators with information about their rights and duties, thus filling the potholes of ignorance. Arming the municipal corporators with proper and adequate information not only adds to their capacities but is also the formula for 'disempowering' the ruling political class.

'Master Trainer' Shri Rana Mani Tiwari follows this line of argument in his presentations, which are complemented by group discussions and role-plays.

The standard presentation focuses on:

1. The level and extent of pollution in River Ganga
2. The ill effects of river pollution
3. Reasons for river pollution
4. Role of councilpersons in conserving and managing local urban environment
5. Control of environmental defaulters
6. Role and contribution of civil society in the above

The capacity building sessions specifically discuss relevant statutes viz.

1. Uttar Pradesh Municipal Act 1994
2. Water (Pollution Abatement and Control) Act 1974
3. Water (Pollution Abatement and Control) Act 1975
4. Water (Pollution Abatement and Control) Act 1977
5. Water (Pollution Abatement and Control) Cess Act 1978
6. Factory's Act 1948

All the sessions, with their inbuilt components of awareness generation and presentations of empirical evidences, are repeated at regular intervals — sometimes daily when the Corporation is in session, or in testing times like the present when Varanasi Municipal Corporation is all set to seek a fresh mandate.

The capacity building program is based on empirical realities and also readings from the following publications:

1. Neera Chandhok: *State and Civil Society – Explorations in Political Theory*. Sage Publications, London, 1999.
2. Rajesh Tandon: *Voluntary Efforts, Civil Society and State*. PRIA, New Delhi, 2001.
3. Sahbhagi Shikshan Kendra: *Ghazipur Municipality – A Study*. Sahbhagi Shikshan Kendra, Lucknow, 2002.
4. Sahbhagi Shikshan Kendra: *Our Institutions of Urban Local Governance*. Sahbhagi Shikshan Kendra, Lucknow, 2002.
5. Sankat Mochan Foundation: *Civil Society Partnership*. Sankat Mochan Foundation, Varanasi, 2002.

3.1.2 Three-day corporators' conclave (Sabhasad Sangam) for members of Varanasi Municipal Corporation

The capacity building program was capped on 30th September to 2nd October with a formal conclave of corporators and other citizens at Tulsi Ghat. It included the following:

I. Symposium: People's Participation in Urban Development and Planning in the context of 74th Amendment to the Indian Constitution — 30th September

II. Symposium: Fraudulence in Constituency Delimitation and Seat Reservation in the context Urban Local Self-Government Elections — 1st October

III. Symposium: Relevance of Gandhian Philosophy in Contemporary Society — 2nd October (Birth Anniversary of Mahatma Gandhi)

More than 250 persons heard Dr V B Mishra call for "real empowerment" of local democratic institutions and proper "devolution" of power as mandated in the Indian Constitution. He further said that the democratic decentralization is the need of the hour if all-round sustainable development is to be achieved. He said devolving real power and authority to local democratic institutions will ensure accountability and enhanced public good.

Mani Shankar Pandey, a former member of the state legislative council, facilitated the symposia. Other resource persons included Sagar Singh, a renowned lawyer; Dharmsheel Chaturvedi; Professor Nirmal; Professor B N Pandey; Professor Abdul Kalaam; and Indradev Mishra. The symposia were chaired by Professor R K Mishra, former Vice-Chancellor of Gorakhpur University.

3.2 Clean Ganga Day 2005 New Delhi: 15th September

The third annual Clean Ganga Day could easily have been described as "Clean Ganga Days" since the various events occurred between 13th and 16th September along with a website "www.cleangangaday.in". "Clean Ganga Days" included a "The Distressed River Ganga" photographic exhibition at the India Habitat Centre; two Ganga-themed cultural evenings; student manifestations "Clean Ganga Now!"; "Healing a Distressed River" seminar of experts on 15th September; and a workshop for corporate leaders the following day, held at the British High Commission.

3.2.1 Website: www.cleangangaday.in

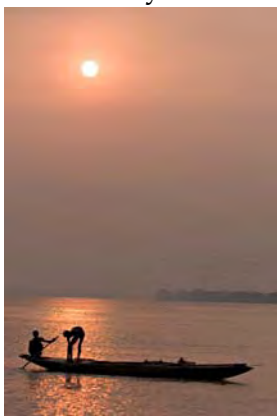
Originally meant as a micro-site for Clean Ganga Day informational purposes only, the site quickly expanded into something far more ambitious–thanks to volunteers.

At this point in time, the site probably contains more useful information about Ganga than any other site on the net. Special features included a petition to the President of India asking him to provide a vision for Ganga. Anybody can send this petition to him by simply pushing a button or two. The site also offers questionnaires and a bulletin board that did not attract much attention, probably because the site was never publicized. Bearing that in mind, a similar site can be smartly utilized for next year's Clean Ganga Day.

The website "www.cleangangaday.in" is hosted on Windows platform with 20 MB space, control panel, POP3 accounts, unlimited autoresponders, unlimited FTP access, detailed web statistics and webmail support. The website has more than 100 web pages now including search engine optimization and meta-tagging.

3.2.2 The Photographic Exhibition: "The Distressed Ganga"

The misery of the River Ganga–and also her stunning beauty–found



expression in an exhibition by the Photography Arts Association of India supported by the Visual Arts Gallery at India Habitat Centre.

Running from 13th to 15th September at the India Habitat Centre, the recently snapped pictures were done *pro bono* for the Campaign**.** The locale at the India Habitat Centre was provided at concessional charge.

Believers worship the River Ganga as a divine goddess who is, by definition, pure. But the photographs told another story. Juxtaposing the river's innate beauty with garbage heaps, open sewage drains and suffering children, the exhibition made a deep impression.

Comments from the guest book:

This is a very interesting exhibition, and certainly the first time I have seen anything dealing with this issue

Vijay S Jodha

It is indeed a delightful exhibition. I particularly liked the picture of night scene in Varanasi. The pictures toward the end were quite sad and well…still beautiful. It is very inspiring

Mayank Singh

Not an easy subject to shoot, nevertheless creativity and hard work have been transformed into wonderful pictures

S Pratap

Excellent eye-opener to what is happening in our nation. Keep it up!

Reni Rajan

This is really an excellent exhibition beyond my expectations. Some of the pictures can win international awards, I am sure. God bless these young people who are really so devoted

S. Paul (internationally renowned photographer)

Five Delhi-based photographers (Dinesh Aggarwal, Dipesh Mehrotra, Rajnish Gehlawat, Rathika Ramasamy and Vikas Malhotra from Photography Arts Association of India — PAAI) between 1st and 5th September snapped the photographs in Varanasi.

The two guest photographers from US who also donated their photographs for the cause are Austin Hills (San Francisco) and Tyler Hicks (New York). The exhibition has been handed over to The American Center in New Delhi for further display, before going on parade abroad.

3.2.3 Seminar: "Healing a distressed River"

India International Centre

Media attention focused on the Ganga River seminar of experts on 15th September at the India International Centre**.** Nearly 100 people were crammed into a conference room, where politicians, environmentalists, diplomats, physicians, lawyers and spiritual leaders dealt with this agenda:

- Is the ravaged Ganga ultimately a moral issue?

- Placing Ganga pollution onto the national political agenda, in accordance with the 74th Amendment to the Indian Constitution giving municipalities the final say.

- How can the great river be cleaned? At what cost? Which technologies are appropriate under Indian conditions?

- River pollution and public health: Does pollution in Ganga kill?

- Ganga renewed! What are the environmental and economic benefits of a clean river?

Background papers on these topics were prepared in advance, so that speakers were forewarned and forearmed. They were requested at a later stage to make their addresses available in written form to be published in a book sometime early next year, kindly funded by the British High Commission. Rough transcripts have already been made available.

The ultimate aim of the seminar was to explore the full extent of Ganga distress and suggest solutions. The speakers included: Sir Michael Arthur KCMG, the British High Commissioner; Dr V B Mishra, Founder President of Sankat Mochan Foundation and Campaign for a Clean Ganga; Dr D K Sundd, Executive Director of Sankat Mochan Foundation; Justice Rangnath Mishra, Former Chairperson of National Human Rights Commission of India; Shri Yogendra Narain, Secretary General of Rajya Sabha — Upper House of Indian Parliament; Dr K K Jajodia, Chairman of Duncan Macneil Group of UK; Swami Agnivesh; Shri Rajesh Kumar Mishra, Member of Parliament from Varanasi; Dr V K Ramteke, Medical Superintendent of Loknayak Hospital; Dr M C Chaturvedi, water resource management expert; Shri Ajay Vij, Coordinator of Art of Living Foundation; Dr Shantum Seth, Zen Master and Director at United Nations' Development Program; Shri J S Sinha, Advocate at the Supreme Court of India; Dr Jyoti Parikh, environmental economist; Shri Vimlendu Jha, Coordinator of We for Yamuna; Dr Alka Pande, Art Consultant at the India Habitat Centre; Dr K Anand, Centre for Community Medicine at All India Institute of Medical Science; and Dr H S Shukla, Senior Oncologist from Institute of Medical Science at Benaras Hindu University.

The media was struck by the fact that both the American and British governments, through their top envoys, had endorsed the Campaign for a Clean Ganga in public statements that coincided with Clean Ganga Day events. British High Commissioner Sir

Michael Arthur KCMG was the inaugural speaker at the seminar and pledged continued material support; while American Ambassador David Campbell Mulford had been scheduled to speak the following day at the corporate workshop. He had to decline at the last minute, but his powerful statement remained unchanged.

Sir Michael Arthur told the seminar "Ganga is vital to the world and not just India alone, in view of its contribution to the world economy." The river interacts with some 550 million people in the Ganga Basin. Sir Michael Arthur went on to say: "We know that the solution to the plight of the Ganga lies in the coordinated and consistent support of all sectors of business, government and civil society."

His call for a public-private partnership was seconded in the public statement from the US Government. In the statement, Ambassador David Campbell Mulford said: "I commend the work of civil society groups that are reaching out to businesses and the community at large to improve the condition of the Ganga River…we are confident that public-private partnerships in which communities and businesses work together are essential for success…."

The American Ambassador added that corporate leaders "will have to play an increasingly important role…to successfully meet the challenges of an improved infrastructure and a better quality of life for the citizens of India."

The British envoy said the High Commission has given support to the Sankat Mochan Foundation in recent years, both in the form of financial support for a ghats' cleanup and beautification project, and through participation in previous Clean Ganga Day events.

Sir Michael Arthur and Lady Arthur were delighted to visit the Foundation and the *Swatcha Ganga* team last year in Varanasi, he said. "That visit gave me a first-hand view of the challenges posed

by the pollution of the holy river, and also of the enthusiasm and energy which exists within the community of Varanasi to find a sustainable solution."

The British Government will continue to take a keen interest in the fate of the Ganga – and support, both morally and materially, the ongoing Campaign for a sustainable solution, said Sir Michael Arthur. "The United Kingdom has a community of over 1.5 million people of Indian origin, and our own River Soar in Leicester has been consecrated with water from the Ganga to enable the scattering of ashes. This illustrates the worldwide importance of the Ganga."

He felt that the waterway could be restored in much the same way as the River Thames in England. The High Commissioner emphasized that public pressure is a key to river cleanups. "No great waterway in the world has ever been successfully cleaned without public pressure being brought to bear."

Another speaker — Dr K K Jajodia of the Jajodia Foundation — recalled the Ganga vision of the late Prime Minister Shri Rajiv Gandhi. When launching the Ganga Action Plan (GAP) in Varanasi in 1986, Shri Rajiv Gandhi stated: "in years to come, not only the Ganga but all our rivers will be clear and pure." Public participation, he believed, would be vital for its success.

But Shri Rajiv Gandhi's vision has still not been realized, noted Dr Jajodia. "Citizens must now step forward to make it finally happen, in partnership with government and business."

Citizen involvement is not always easy, stated Dr Shantum Seth of UNDP. In discussing the need to nurture the volunteering spirit in India, he felt that "many Indians do not connect to the environment at the more personal level, and hence there's a gap between needs and wants."

The failure of the Ganga Action Plan leaves the world's most important river more polluted than ever, said Dr V B Mishra *(Mahantji)*, leader of *Swatcha Ganga* and President of the Sankat Mochan Foundation. He stated that hundreds of millions of liters of raw sewage and effluents are dumped into the river every day by

103 cities. "With an estimated 550 million souls depending on Ganga, the level of human suffering is immense at times. As well, marine and wildlife are at risk, in some cases irretrievably."

Excerpts from Dr V B Mishra's keynote address at the seminar:

"*.... as young professors and engineers, we never suspected that the battle for the Ganga would be protracted and even bitter. At first, we sensed a kind of victory when in 1986 the late Prime Minister Rajiv Gandhi came to Varanasi and announced the Ganga Action Plan. This involved setting up treatment plants in 29 cities. That sounded like a good start, even though a total of 103 cities, in fact, dump toxics and raw sewage into India's lifeline; supporting an estimated 550 million of our citizens.*

By the early 90s it became clear that the Action Plan was failing. The problems were manifold.

Wrong technologies were chosen: Somebody had forgotten about fecal-coliform altogether. And with frequent power breaks in northern India, the plants would shut down altogether, and it takes a big effort to get them running again. Maintenance problems are rife, municipalities can't always pay the power bills, and in any event the pumps get flooded during the monsoon season. The plants cease to work altogether then, for up to 3 months.

We were thus obliged to launch the second battle of the Ganga. For starters, we staged an international Ganga seminar in 1992 to assess what was happening. And what could be done. The mood was grim. Despite the Ganga Action Plan, the river was more polluted than ever. Since the government refuses to publish all its official statistics about river pollution, some Swedish environmentalists helped us establish our own private laboratory at Tulsi Ghat where we daily take samples ourselves. We now know, for instance, that the fecal-coliform count can rise as high as 67,000 times the accepted Indian standard for human bathing.

The Foundation then launched a search on the request of Varanasi Nagar Nigam for a better technology for our city. Together with the University of California we devised a detailed plan for cleaning the crucial seven-kilometer stretch in Varanasi that would utilize a system relying on biological treatment and sunlight to cope with wastewater.

Mainly non-electrical, the system is relatively inexpensive and easy to maintain. Wastewater from open drains is diverted through a pipeline into biological treatment ponds, where it is treated by a combination of bacteria and algae. Electrical power doesn't even enter into the picture. This system, technically called AIWPS, is an adaptation of a tried-and-true pond system found in some American communities.

The Municipal Corporation of Varanasi unanimously approved this system for the holy city. The Corporation has that inalienable right under the Indian Constitution. But the state government of Uttar Pradesh then intervened, and tried to impose a new version of the old Ganga Action Plan, which wasn't going to work anyway.

This has become a court case pending before Allahabad High Court with huge implications for municipalities across India. The 74th Amendment unambiguously castes obligations upon the municipalities to determine and implement policies and technologies for wastewater treatment and other environmental measures within their jurisdiction.

While awaiting the legal decision, the Campaign is doing everything in our power to alleviate the situation in Varanasi. Squads of Ganga cleaners every day remove litter from the waterfront, along with animal and human corpses floating in the river. We run an adopt-a-ghat program where citizens undertake to keep a ghat clean and tidy. We conduct innumerable awareness workshops across the Basin, go into the schools, and of course, stage events like Clean Ganga Day 2005."

Speakers Dr V K Ramteke of Loknayak Hospital in New Delhi and Dr K Anand of Centre for Community Medicine, All India Institute of Medical Science, reviewed health hazards posed by river pollution. There is the ever-present risk of waterborne diseases that can lead to pandemics. Cholera, yellow fever, diarrhea, amoebic dysentery and jaundice are among the more common diseases caused by water contamination. Skin diseases may be affecting millions: data is not always as accurate and forthcoming as it should be.

More than one speaker underlined the need for appropriate wastewater technologies. In Varanasi, a mainly non-electrical wastewater system that utilizes interaction between bacteria and algae has been approved by the Varanasi Municipal Corporation. It is being thwarted by the Uttar Pradesh Government, which seeks to impose a variation of Ganga Action Plan (GAP) on the city — a system that fails to address diversion of

sewage from open drains, as well as shocking fecal-coliform levels. Fecal-coliform is found in animal and human excrement in water.

Seminarians were informed that court cases are proceeding against the Uttar Pradesh Jal Nigam and the Japanese International Cooperation Agency (JICA), both charged with bypassing a city's right to environmental management within its jurisdiction, as stated in the 74th Amendment to the Indian Constitution. Supreme Court Advocate J S Sinha told the seminar he thought it very important "to clean the Ganga according to the schedule and provisions as per the amendment."

Dr Rajesh Kumar Mishra, Member of Parliament from Varanasi, discussed the issue he raised in Parliament concerning the cleaning of Ganga, and read out the written reply from the Environment and Forests Ministry, which pointed to measures being taken under "phase two" of Ganga Action Plan (GAP). Dr Mishra found the reply inadequate. He said the public has the right to comprehensive and transparent information about the extent of Ganga damage.

Dr V B Mishra *(Mahantji)* closed the proceedings with a call for zero tolerance to wastes in rivers. "It should be noted that member states of the United Nations have demarcated 2005-2015 as the International Decade for Action: Water for Life. They want the sources of river pollution eradicated by 2015. And that far more human beings should have access to clean water by then."

Getting serious about Ganga pollution, he said, will send a positive shock wave across the developing world, where virtually all rivers are polluted. "And also open up for India new social and economic opportunities that accrue from important environmental investments."

He endorsed the call by the American and British envoys to seek public-private partnerships for cleaning the river. "Any plan to clean the Ganga should be needs-based and community based, and

not imposed from the outside in violation of the 74th Amendment to the Indian Constitution." This would be in the best spirit of the late Shri Rajiv Gandhi and his vision of active civil society participation in river issues.

3.2.4 Student manifestations: "Clean Ganga Now!"

Cultural manifestations, poetry, pledges and serious presentations were the highlights of the student program held on 15th September at India International Centre, right after the morning seminar.

About 150 students from the Delhi Public School system participated in the manifestations that concluded with presentation of certificates of participation and mementoes, given to each of the students by Ms Marie Anne Everitt of the American Embassy.

Originally scheduled to take place on the spacious lawns of the India International Centre, a sudden downpour moved all the events indoors. This did not deter student enthusiasm.

> A K Mangotra, Joint Secretary to the President of India, attended the student manifestations, on president's behalf.

Extracts from student presentations:

Today, Ganga is filthy. It is pumped with raw sewage, industrial waste, human and animal carcasses every day of its existence – despite that, we have the audacity to call it pure? I've never seen anything more hypocritical than that – we bathe in it, we drink it, we sell it, we workshop it but…we pollute it.

Amit Sharma

The pollution of the river is the direct outcome of long-term public indifference, diffidence and apathy. There is a lack of public awareness, and poverty fuels the problem…there is a need for nationwide awareness programmes. And a definite plan, which takes concrete action and doesn't fizzle out.

Ridhi

Its man's duty to preserve what God bestows, what comes down from God, Man should never defile.

Nitika Lal

Today I'm in pathetic shape
I lie before you with my soul raped

Oh sons of India it's your duty
To protect your mother's soul and beauty

Save me, my children, before I perish
Keep me pollution free, love me and cherish

Nikita Chawla

The Council for Environment and Culture of Delhi Public School Society and its Director Ms Suleena Sapra helped us to choreograph the student manifestations. Delhi Public School(s) are the first, which have concertedly worked on sensitizing their students about river pollution. The Delhi Public School in Varanasi has been closely working with Sankat Mochan Foundation, providing them with student volunteers.

During the student manifestations we circulated a questionnaire to participating students, to which 95 responded. Results show that they regard pollution as Delhi's most pressing problem; they think the Ganga Campaign is excellent; they regard the level of Ganga pollution as high; they see municipal sewage as the worst culprit; they believe that local people contribute to Ganga pollution with solid wastes; they believe that poverty is the most pressing national problem; they support NGOs working on environmental issues, and they aren't aware of the concept "civil society". They said they really benefited from the Clean Ganga Day event, and perhaps would come to Varanasi to check out river pollution for themselves. We have been told by Delhi Public School that they are bringing these children for a hands-on experience in Varanasi in mid-November. A basic conclusion is that students should acquire a better understanding of civil society in order to become responsible citizens.

3.2.5 Cultural evenings: "Ganga Rhythms"

Two cultural evenings were scheduled on 14th and 15th September. The former was cancelled at the last minute due to heavy rainfall: it was to be staged in an open-air amphitheatre at the India Habitat Centre. Lady Arthur, spouse of the British High Commissioner, was to be the guest of honour.

The second cultural evening at the (fully-enclosed) Triveni Kala Sangam Auditorium in New Delhi featured the Odissi Dance Troupe led by Guru Pravash Kumar Mohanty–their second annual appearance at Clean Ganga Day events. The performers were all students of Patitapawan Kala Niketan from New Delhi. Ms Anne Marie Everitt from the American Embassy was the guest of honour.

Ganga is not only a story about pollution. It is also a river that India celebrates.

The impressive cultural evening at Triveni Kala Sangam drew a large crowd who witnessed the Odissi dance recital presented by the disciples of Guru Pravash Kumar Mohanty.

About 25 disciples of Guru Shri Pravash Kumar Mohanty trained at Patitapawan Kala Niketan presented various soul-warming performances in Odissi style. The "Ganga Rhythms" concert was classic in its execution. One dancer, for instance, salutes Mother Earth followed by obeisance to Lord Shiva and Mother Ganga.

Swatcha Ganga! Clean Ganga! The message echoed all around.

3.3 Corporate luncheon and business leaders' consultation

The first-ever corporate workshop about Ganga pollution was conducted on 16th September in New Delhi at the British High Commission.

Purpose of the 3-hour session was to brief businesspeople about the status of the Ganga, and also to determine an action program where the business community can get on the bandwagon.

British High Commission
New Delhi

Development Alternatives

64 participants, including citizens from professions other than business, attended the workshop, hosted by the British High Commissioner.

Facilitator was Mona Chhabra Anand of Development Alternatives, who led participants in these discussions:

- How does Indian business "lose" from worsening pollution of the Ganga?
- How might Indian business gain — individually and collectively — from actively pushing for a cleanup?
- How can the business community cooperate with environmental groups like the Sankat Mochan Foundation to create public pressure to clean the Ganga?
- Next steps: action-planning exercises

General consensus was that Indian business as a whole would gain significantly by being identified with Ganga cleanup. Due to a lack of time, the action-planning steps were not fully explored. Follow-up with participants is indicated.

Keynote speaker was Dr Veer Bhadra Mishra. He said that businesses linked with Ganga campaign could experience short-term gains, such as good PR, and also long-term benefits, such as winning contracts or new business opportunities as a result of a Ganga cleanup. "Cleanup of Ganga and other rivers would be a big step in correcting a vague international image of India as a dirty and unhygienic place in which to do business."

Excerpts from Dr V B Mishra's keynote address:

"*.... this workshop presents an historic opportunity for the Indian and international business communities. The question before us is urgent: to heal the distressed River Ganga by prioritizing her in CSR agendas. The failure of the Ganga Action Plan tells us that the business community must actively partner with citizens and government to get the job done.*

Let me summarize the challenge. A total of 103 cities dump toxics and raw sewage into the waterway every day. Millions suffer because of pollution in the Ganga, which is literally the most important river in the world. It supports about 550 million citizens or 1 out every 12 human beings on the planet. Without Ganga, their existence is impossible. Bathing in it. Drinking it. Washing clothes in it, irrigating their fields, dying by it, and then having their ashes borne away by it.

We do not have very much time to clean this river. Apart from the ever-present risk of epidemics, it also happens that United Nation member states have urged that unsustainable exploitation of rivers like Ganga be halted by 2015 as a Millennium Development Goal. India has never been good at meeting environmental goals. Let's try to improve our batting record this time around!

I think this corporate workshop will want to ask some frank questions. The most important is whether or not the business community should play a role in producing a concrete plan to clean the waterway.

We'll also want to ask whether businesspeople in cooperation with environmentalists can help create public pressure to clean the Ganga. The fact is, that no great river in the world has ever been cleaned without public pressure being brought to bear.

Businesspeople have companies to run and profits to be earned. I hope this workshop will discuss the specific gains for businesses that choose to be linked to a cleanup. Some gains are short-term, such as good PR. Others are long-term, such as winning contracts or new business opportunities as a result of a Ganga cleanup. I should add that, in my opinion, cleanup of Ganga and other rivers would be a big step in correcting a vague international image of India as a dirty and unhygienic place in which to do business."

Participants were provided with considerable documentation in order to facilitate their discussions. They agreed that advantages accruing to businesses as a result of a cleanup included:

1. Cleanup of river in stages → creates new contracts and jobs → creates new business opportunities → creates economic boost for communities along the river
2. Clean surface water suitable for irrigation → more irrigation water for more fields → "cleaner" crops → bigger harvests → new export markets
3. Clean surface water restores marine life → boost for fishing industry → decrease in fish contamination → bigger fish yields

4. Clean surface water benefits public health → reduction of waterborne diseases → reduced public health costs → healthier labor force
5. Clean surface water easier and cheaper to treat for human consumption → increase in available safe water for population → reduced reliance on groundwater and deep water wells → correction in current downward slide of water tables
6. Clean surface water suitable for human bathing → more bathers and beaches → bonus for international tourists → new tourist facilities → new vistas for boating and water sports
7. **Cleanup of Ganga and other rivers helps to correct a vague international business image of India as a dirty and unhygienic workplace**

Participants were told that the Indian business community has been handed an historic opportunity because of an international pledge made by the Union Government.

It has promised the world that unsustainable exploitation of rivers like Ganga will be halted by 2015. And that safe water will be available for most of our citizens by then. The pledge was made in accordance with the United Nations Millennium Development Goals (MDG7 – targets 9 and 10) and International Decade for Action: Water for Life 2005-2015.

The year 2015 may sound far away. But huge infrastructural projects normally take huge amounts of time before they bear fruit. They cannot be achieved without active participation by business.

Participants realized that when it comes to Ganga, the challenge is daunting, to say the least. A total of 103 cities dump toxics and raw sewage into the waterway every day. The risks for human beings are obvious. Millions suffer.

The workshop concluded with the thought that Ganga presents an historic opportunity for the business community. There are commercial and PR opportunities to be won the day India clean her rivers, not least the Ganga. Even the start of a true cleanup will send a positive signal across India and the developing world where virtually all rivers are polluted.

Topics to be discussed at a later date:

1. What can a major stakeholder like the business community actually does to hasten the day — to really get the Union Government on the bandwagon?

2. Can business leaders include the plight of suffering millions in their corporate social responsibility schemes?

US Commercial Service, New Delhi, supported the workshop. Mr Andrew Partridge of the British High Commission presented the vote of thanks.

3.4 Lecture tours in Britain and Sweden

The program coordinator made three trips to London in 2004-2005, where he delivered 14 talks in public schools about the state of the river. These schools are situated in a predominantly Asian district in West London.

He also delivered a one-hour lecture on 16th January 2005 in the British capital, at the South Place Ethical Society. About 60 people attended, including journalists and reps from Indian High Commission. The Society is a prominent intellectual forum founded by political philosopher Jeremy Bentham in 1793. The lecture was followed up by his article "The Ganga is Polluted: So What?" in the *Ethical Record*, published by the Society. An abridged version was then written for the British environmental website "www.peopleandplanet.net".

GROUNDWORK WEST LONDON

The London tours were financed privately. In addition, modest non-financial assistance was received from Groundwork West London — a UK Government financed foundation — along with the Temple Trust and our longtime MoU partner Thames21. Thames 21 fields up to 5,000 volunteers to keep the Thames riverfront tidy.

Assistance from these organizations specifically included advance planning and scheduling; introductions; publicity; production of modest flyers, and a PowerPoint presentation. Former Mayor of the London Borough of Ealing, Umesh Chander JP, offered important moral support, and promised future introductions to the broader Indian community in Britain and "India friendly" MPs in the House of Commons.

The program coordinator gave 9 talks in 2004-2005, at various forums in Sweden, including two talks at the main Hindu temple in Helenelund, north of Stockholm. Forums addressed by him included groups such as the United Nations chapter in Sollentuna north of Stockholm and the Social Democratic Party association in the same town.

The coordinator's program in Sweden was capped by a talk to an estimated 300 members of the Indian community at their annual Diwali celebration in the Swedish capital. Modest expenses during the Swedish phase were financed privately. As in the UK, the aim was to set the stage for possible fundraising in Scandinavia. Partners would probably include the temple; Indo-Swedish associations comprised of Indian immigrants, and the Indian Embassy. The latter played an invaluable role in securing introductions.

4.0 PROMOTIONS & PUBLICITY

Mainline Hindi and English language media in India covered clean Ganga Day events extensively, viz., *Rashtriya Sahara, Dainik Jagran, Asian Age* and *Indian Express*. *The Delhi City* and *Delhi Diary* included the events in their listings. International impact is not known. At the same time, *Mahantji* was nominated by readers of the Indian weekly *Outlook* (September 26th issue) as one of India's outstanding citizens.

On the main day of the events, we placed small advertisements in two mainline English language newspapers — *Times of India* and *Hindustan Times*. Online promotions appeared on "www.rediff.com" and "www.google.com". Take-away cartons of Nexus Foods — a leading Indian fastfood chain, which also supplies delicacies in its take-away cartons to Austrian, Continental Airlines, Air Canada, British Airways, Lufthansa, Virgin Atlantic, Air France, South African Airways, Qantas, Cathay Pacific, Qatar Airways, Kuwait Airways, Emirates and Etihad — carry a plea to support "Campaign for a Clean Ganga" with "www.cleangangaday.in" in its byline.

Sankat Mochan Foundation released 5 press releases while the British High Commission did 2 and Indo-Asian New Service did 1 press release.

Media tended to focus on statements made by Sir Michael Arthur KCMG, British High Commissioner to India. The Press Trust of India said "Britain offered to assist India in the ambitious 'Clean Ganga' project as it has 'considerable experience' in cleaning pollution in such water bodies."

New Kerala Newsline, Chennai Online News and *MSN News* reported that "without criticizing the Ganga Action plan…Arthur said there was urgent need to use 'appropriate' technology' for the cleaning of the Ganga.

"Organizers here said: 'Though Sir Michael Arthur would not comment on any specific project, his support itself says he favours the use of the traditional and inexpensive system of de-polluting through sedimentation ponds, as against setting up sewage treatment plants.'"

Coverage was not always accurate. *WebIndia* incorrectly stated "even former US president Bill Clinton has sent a congratulatory message to the Sankat Mochan Foundation of Varanasi, which has spearheaded the campaign to rid the river contaminated by raw sewage and chemicals for over a century."

(In fact, Clinton's statement was made in 2000 after meeting *Mahantji* during the president's state visit to India.)

Asian Age noted that "the British High Commissioner said his country had been funding a project to clean the Ganga through an NGO, Sankat Mochan Foundation, and was willing to help in the future also."

(In fact, the Sankat Mochan Foundation, through its Ganga campaign, is a public pressure group rather than an organization that would itself clean the river.)

Some media used SMF press releases almost verbatim.

The television channels, which covered the events, are Eenadu Television and Channel 7 JTV.

Asad Mirza of Press and Communications Department of the British High Commission, New Delhi, coordinated the media

management. Mediatrack, New Delhi; and Noida Ad Agency, NOIDA did news monitoring.

5.0 SOME CONCLUSIONS

The three-year Civil Society Partnership Program came at a critical juncture; and Varanasi has now gotten a boost. But the near collapse of effective governance elsewhere in Uttar Pradesh and Bihar is also reflected nationally, to some extent. Water management — or the lack of it — is an excellent example of state apathy. This has duly been noted by the World Bank. The country's development of water infrastructure is not accompanied by an improvement in governance of water resources and water services, says a newly-released World Bank report, prepared by John Briscoe, country director for Brazil and senior water advisor for South Asia.

Although the Bank is prepared to increase loans to India for the water-related sector, it notes that "the Indian state water apparatus still shows little interest in the key issues of the management stage: participation, incentives, water entitlements, transparency, entry of the private sector, competition, accountability, financing and environmental quality."

Ineffective and secretive water management, accountable to no one, is one of the main reasons for the collapse of the Ganga Action Plan (GAP) and rising pollution levels in Ganga, which at times is nothing more than a sewer. In cities like Varanasi, meantime, councilors still struggle to obtain the right of environmental management granted to them by the 74th Amendment of the Indian Constitution.

Entrenched interests such as the bloated GAP bureaucracy, meantime, stand in the way of effective environmental management of the Ganga and, by implication, other rivers in India — a country that derives some 85% of surface water from rivers.

The Campaign for a Clean Ganga must step up its pace. We all know that great rivers are never cleaned before public pressure has its day. Our ability to influence and perhaps mobilize public opinion could well be a determining factor of whether the Ganga is effectively cleaned anytime in the next few years.

Another factor is to bring together the main players in India — civil society, business, government and media — to agree on river strategy: in all likelihood, a public-private partnership to clean

Ganga and other waterways. This course of action is being suggested to India by the American and British governments.

In 1986 the late Prime Minister Shri Rajiv Gandhi came to Varanasi and announced the Ganga Action Plan. His vision is yet to be realized, neither in the holy city nor any of the other 102 cities and towns that dump billions of litres of raw sewage into Ganga, day in, day out.

There is no good reason why a revered river like Ganga is polluted in the first place. India does have capital access, manpower and technologies to clean the entire Ganga–all 2,525 kilometres of it.

If the nation wants to, that is.

National events such as Clean Ganga Day are definitely having their effect, which is why we plan to stage it, yet again, in 2006 in New Delhi. Grassroots activities in Varanasi are at least as important — suggesting that capacity-building training at the Varanasi Municipal Corporation must continue.

Other programs such as riverfront cleaning funded by Oxfam India; village water initiatives, environmental education for students and riverside stakeholders' capacity building funded by OzGreen, Australia and community supported "adopt-a-ghat" program all proceed apace, while "sensitization workshops" about river pollution help to ensure public participation in both the analysis of the problem and possible solutions.

Also crucial is ongoing litigation asserting the right of Indian communities to determine own environmental management. No Indian authority or institution can bypass the final verdicts of courts of law.

5.1 The last word

And finally: will the great river ever be cleaned?

We believe a degree of success is within reach. The Union Government can no longer ignore the Campaign, along with the publicly stated views of the World Bank, the United States, and Great Britain. The heart of the Indian problem is a policy dysfunction at the highest level. There is every good reason to believe that this state of affairs can be changed for the better.

6.0 COOPERATION BETWEEN THE UNITED STATES AND SANKAT MOCHAN FOUNDATION: SUMMARY

United States is a key international participant assisting *Swatcha Ganga Abhiyaan* {Campaign for a Clean Ganga (Ganges)} that is managed by the Sankat Mochan Foundation (SMF) in Varanasi. Cooperation started in 1991 with an international conference about Ganga....

- United States Agency for International Development (USAID) provides much-needed funding in 1991 for an international conference in Varanasi on "Pollution Control in River Cities of India: A Case Study of Ganga in Varanasi." Participating are experts from the United States, France, Sweden and India

- Over the next few years, USAID provides various river experts and financial assistance that lead to an appropriate technology solution for the river in Varanasi. Devised jointly by SMF and the University of California (Berkeley), the mainly non-electrical system called AIWPS consists of a series of ponds that treat wastewater biologically. The US-Indian engineers had determined that a mainly non-electrical pond system, including interception and diversion of wastewater utilizing gravity, was more appropriate for Varanasi because of frequent power breaks in the city. The groundwork by engineers is vividly described in *The New Yorker* article "Next Life for the River Ganges" by Alexander Stille

The long-running Campaign for a Clean Ganga is led by Prof Veer Bhadra Mishra, who is also a Hindu high priest (*Mahantji*)
Photo © TIME

- Former President Bill Clinton, in a keynote address in Agra in 2000, publicly praises The Campaign for a Clean Ganga. *Time* magazine nominates Campaign leader Dr Veer Bhadra Mishra as "hero for the planet" for bringing the plight of Ganga to the attention of the world

- From 2002 onwards the Civil Society Partnership Program at SMF, funded by The Asia Foundation, San Francisco in cooperation with United States-Asia Environmental Partnership (US-AEP) Program at USAID, raises public

awareness about Ganga pollution throughout the Ganga Basin. Numerous workshops and seminars are conducted for local elected officials, citizens and other NGOs

- In 2003 the nation's first Clean Ganga Day is held in Kolkata (Calcutta) by the Civil Society Partnership Program

- Success of the event led us straight to the nation's capital. Clean Ganga Day 2004 in New Delhi on August 27 consisted of a morning symposium of river experts, parliamentarians and notables; afternoon manifestations by school students, and an evening concert. It was inaugurated by Robert O Blake, Jr, US Deputy Ambassador to India

- US Deputy Ambassador Robert O Blake invites *Mahantji* for a working lunch on a visit to Varanasi in July 2004 to explore areas of cooperation between SMF & American Embassy

- Clean Ganga Day 2005 was held in New Delhi on September 15 followed by a presentation for corporate people on September 16

Of course, this is a list of specific cooperation areas between SMF and US, rather than a complete list of SMF programs during the 14-year period. SMF also played host to two US ambassadors to India, one congressperson and a couple of senators during the period. We are so very grateful for the longstanding commitment by American Embassy and USAID spanning three presidential administrations!

7.0 COOPERATION BETWEEN THE UNITED KINGDOM AND SANKAT MOCHAN FOUNDATION: SUMMARY

India and the United Kingdom are linked immeasurably and not least, by a profound respect and concern for the River Ganga.

She is not only the supreme holy river for believers, but also the world's most important waterway, supporting nearly 550 million lives in the Ganga Basin: "Bathing in it. Drinking it. Washing clothes in it, irrigating their fields, dying by it and then having their ashes borne away by it," as British author Eric Newby put it.

But toxics contaminate the great waterway, putting millions at risk. So say nothing of disease-causing faecal coliform — animal and human wastes in water.

The Sankat Mochan Foundation (SMF) in Varanasi — dedicated to a Ganga cleanup — turned to Britain as early as 1991, for both moral and material support. Because the battle of the Ganga is not easy, to put it mildly. The SMF mission is to alter mindsets in India about the importance of a cleanup of her literal lifeline. Indian environmentalists want the nation to fulfill its Millennium Development Goals pledge to the United Nations to not only provide safe water for more citizens but also to *eradicate* the causes of river pollution.

Similarly, British environmentalists and concerned citizens are anxious to support — in one way or other — all worthy clean water movements and organizations the world over. Our own organization occasionally receives unsolicited donations from UK subjects who have heard or read about us.

Fourteen years of cooperation
This checklist presents examples of cooperation between SMF and the UK. It is not a listing of all SMF activities, which range from Ganga workshops to daily cleanup of the entire waterfront in the holy city of Varanasi.

- UK experts attend the SMF international Ganga conference in 1991

- Leading Indian businessperson in London provides financial encouragement throughout the decade

- Daniel Whistler's film *Battle for the Ganges* centring around SMF campaign activities in the holy city is released worldwide in 1999

- A Memo of Understanding (MoU) is signed in 2002 between SMF and Thames21, the leading riverfront cleanup organization in London. The same year, Thames Chief Executive Mark Lloyd meets in Varanasi with Dr Veer Bhadra Mishra *(Mahantji),* leader of the Campaign for a Clean Ganga *(Swatcha Ganga Abhiyaan)* managed by SMF. The visit is reciprocated by Dr Mishra in 2002, and includes a lecture and temple tour in London, discussions with Indian leaders in Southall in West London, and considerable media exposure

- Over the next two years the riverfront cleanup program along Ganga in Varanasi is closely studied by Thames21,

with aspects adapted for British conditions. At the same time, SMF receives welcome counsel from the British organization in view of its impressive history of mobilizing volunteer workers to regularly clean the Thames waterfront — up to 5,000 citizens in Wellingtons!

- In 2003 the British High Commission in New Delhi signs an agreement with SMF in which a stretch of ghats along Ganga in Varanasi is singled out, not only for cleanup but also beautification: a demonstration project to show Varanasi citizens and the world what can actually be done with the world heritage stone works. They form a physical and spiritual unity with the river. The project managed by SMF is capped by a public diplomacy visit to Varanasi in April 2004 by Sir Michael Arthur KCMG and Lady Arthur to inspect the results. Media coverage is noteworthy

- Success of the ghats project opens new doors. Acting High Commissioner Mark Runacres delivers a lecture at the Clean Ganga Day 2004 symposium in New Delhi

- Former Ealing Borough Mayor Umesh Chander JP visits Varanasi in February 2005 in his present capacity as Chairman of the Temple Trust of Great Britain. He offers to assist in the formation of a "Friends of the Ganges" chapter in Britain to complement similar SMF chapters in Australia, the United States and Sweden

  Meantime, an SMF activist based in Varanasi delivers lectures in West London schools in cooperation with Groundwork West London. This government-supported charity has actively encouraged teenagers to study clean water issues, and particularly in the developing world. In February the schools produce a special issue of *Global Water Times* highlighting Ganga. The tour by the activist is capped by a lecture at the South Place Ethical Society in central London. The lecture is published in abridged form in their journal in July 2005

- The BBC dispatches a film team to Varanasi in June 2005 to document the Campaign for a Clean Ganga

- The British High Commission offers SMF a grant and other forms of cooperation for Clean Ganga Day 2005 in New

Delhi, to top up an existing core grant from The Asia Foundation, San Francisco

The tryst

British concern about Ganga is longstanding. Because Britain, to paraphrase Jawaharlal Nehru, has a unique tryst with Ganga: an affair of the heart. When early British travelers first gazed upon the mighty river, they were not slow in grasping the obvious: Ganga is India.

8.0 PERSONNEL

Staffing remained unchanged.

- Roger Choate — *Program Coordinator*
- Rana Mani Tiwari — *Field Coordinator (salary from SMF)*
- Ashok Kumar Pandey — *Assistant Coordinator (Accounts)*

9.0 FINANCIALS

(FILED IN FORM TAF 209)

Counterpart contributions

SMF continued counterpart contributions to the project, which included use of office space, seminar rooms, staff accommodation, library, computer facilities including printers and scanner, photocopier, electricity, water, emergency power generation unit, salary of field coordinator and well-qualified volunteers as resource persons.

"The UPA government is making special effort to create greater space for civil society — for committed individuals, like...Dr V B Mishra...."

Sonia Gandhi
Chairperson, United Progressive Alliance (UPA) &
National Advisory Council
At the Outlook **Speak Out** Awards function, 8th October 2005, New Delhi

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10.0 TOMBSTONE OF GRATITUDE

Without you, we could not have done it!

American Embassy, New Delhi
Anne Marie Everitt
Anuradha Suda
Ayesha Seth
David Campbell Mulford
Laura D Taylor-Kale
Preetha Nair
Ramesh Jain
Ritika Sawhney
Robert O Blake, Jr
Robin D Diallo
Sameer Verma
Shweta Midha

USAID, New Delhi
George Deikun
Rebecca Black

US-AEP, New Delhi
K Balakrishnan
Kristen Easter

US-AEP, Kolkata
Arup Mitra
Gaurav Mazumdar

US-AEP, Bangkok
Elaine Blatt
Pierre Beaulne
Stanford Smith
Tony Kolb

The Asia Foundation, San Francisco
Christopher S Plante
Leela Young

The Asia Foundation, Colombo
Dinesha Wikramanayake
Hyacinth Razack
Nilan Fernando

British High Commission, New Delhi
Amutha Bharath
Andrew Partridge
Archana Mirajkar
Asad Mirza
Chitra Iyer
Daniel Shepard
David McMahon
Kitty Tawakley
Lady Arthur
Mark Runacres
Nicola Murray
Peter Holland
Preeti Malhotra
Ravi Dutta
Sir Michael Arthur KCMG
Suparna Sharma

Sankat Mochan Foundation, Varanasi
V B Mishra *(Mahantji)*
D K Sundd
S K Mishra
S N Upadhyay
V N Mishra
Vijay Nath Mishra
Frances Peavey
Catherine Porter
Colin Lennox
Sue Lennox
Gopal Pandey, Sr
Anoop Kumar Mishra
Ashok Kumar Pandey
R K Mishra
Rohit Joshi
Dukhi Mani Tiwari
Rana Mani Tiwari
Vashisht Tiwari
N Ravindran
Vinay Pandey
Ajay Pandey
Anupam Dubey
Gopal Pandey
Sunandan Bhattacharya
Shiv Nath
Raj Kapoor
Ramchander
Shankar
Kiran

ELSEWHERE
Ajoy Bagchi
Alka Gupta
Alka Pande
Amar Bahadur
Anupreksha
Arun Bhatnagar
Arun Kumar
Arun Kumar Rawal
Aruna Roy
Ashish
Ashok Khosla
Austin Hills
Balbir Singh
Bhim Singh
Bonani Kakkar
Buzee
Captain August Millard
Chandan Kumar Tripathi
Chotu
Daman Singh
Debopriya Banerjee
Dinesh Agarwal
Dipesh Mehrotra
G M Kapur
Geetpriya
George Vaurghese
Gunjan Goswami
Haresh Chandra Pattanaik
Ira George
J S Sinha
Jalaj
James
James Stein
Jaselin
Jatin Sachdeva
Jayalakshmi Pattanaik
Joginder
K K Jajodia
Kamla Chowdhry
Kishan
Krishna Kapoor
Kumar Pankaj
Lalit
Lalita Arora
Lalita Sachdeva
Livin
Maneka Gandhi
Manish Nanaware
Manoj
Mona Chhabra Anand
Narendra Kumar
Naresh
Nitin
Padmini Shekhar
Pankaj Tiwari
Pooja Punshi
Pravash Kumar Mohanty
Premola Ghosh
Prosun Sen
Rachna Mehra
Raghu
Rahul Barua
Rajnish Gehlawat
Rakesh Jaiswal
Rakhi Chib
Rathika Ramasamy
Sanjiv Kumar Srivastava
Santosh
Sapna Sinha
Savita Gokhale
Seema Pattanaik
Shadaab
Shalini
Shalini Gujral
Shantha Sinha
Shivani Rawat
Shyamlal Yadav
Sidharth Patnaik
Sudip Mazumdar
Suleena Sapra
Sumeet Chugh
Sumeet Katoch
Sunita Dubey
Suresh Anand
Suruchi Jain
Tapsya
Tyler Hicks
Vikas Malhotra
Vimlendu Jha

Thank you!

CIVIL SOCIETY PARTNERSHIP PROGRAM

|| **SWATCHA GANGA ABHIYAAN** ||

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USAID
FROM THE AMERICAN PEOPLE

PUBLIC AWARENESS CAMPAIGNS FOR IMPROVING AIR QUALITY

WORKSHOP REPORT

US-AEP
A Program of USAID

March 15, 2005
This publicatrion was prepared for review by the United Sates Agency for International Development.
It was prepared by Stanford Smith, US-AEP/TSSC Regional Office, Bangkok, Thailand.
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1 - INTRODUCTION & OVERVIEW

The United States – Asia Environmental Partnership (US-AEP), a regional program of USAID, in collaboration with the Centre for Science and the Environment (CSE) of India, organized an international workshop on 5 December in Agra, India entitled "Public Awareness Campaigns for Improving Air Quality". The workshop was the first of its kind, providing an opportunity for practitioners in this area to share experiences with colleagues in the South and Southeast Asian regions. The workshop was organized as a side event one day prior to the start of the 2004 Better Air Quality (BAQ) conference in Agra sponsored by the Clean Air Initiative for Asian Cities (CAI-Asia), of which US-AEP is a member. BAQ is the largest annual forum in Asia for practitioners, scientists, advocates, donors, industries, and governments involved in air quality management in Asia.

The workshop was organized to provide assistance to NGOs and other practitioners working around the region on public awareness/outreach campaigns to promote improved air quality. The event was part of the support that US-AEP provides to regional air quality management initiatives, particularly through its partnership with CAI-Asia. The workshop aimed to assist partners in developing and implementing effective awareness campaign strategies, including how to deliver the message, identifying what has worked well in past campaigns and why, and sharing guidelines from successful campaigns. Three key themes which were presented as questions for group discussion:

- How do you build effective stakeholder coalitions for cleaner air?
- How can scientific data be used most effectively in public awareness/outreach campaigns?
- How do you ensure that public awareness/outreach activities lead to policy changes and behavior change?

Presentations on six selected public awareness projects from around the region focused on sharing lessons learned and generating recommendations for practitioners. Facilitated group work provided opportunities for all participants to discuss key themes, network, and compile information and tools needed to run successful campaigns. Evaluations indicated that 100 percent of participants felt the workshop was useful and they learned lessons they can apply in their home countries. A strong interest in additional workshops/training on this topic was shared by participants.

2 - AGENDA

TIME	SUBJECT / PRESENTATION	Presenters
12:00 – 13:00	Lunch - Registration	
13:00 – 13:15	Welcome & Introduction	Stanford Smith, US-AEP
13:15 – 15:00	*Presentation 1:* "Right to Clean Air" Campaign, Centre for Science and the Environment, India Q&A	Anumita Roychowdhury, Associate Director, Research and Advocacy, Centre for Science and the Environment, India
	Presentation 2: Puerto Princesa Clean Air Program, US-AEP Philippines Q&A	Ninette Ramirez, Program Specialist, US-AEP Philippines
	Presentation 3: Kathmandu Electric Vehicle Alliance (KEVA) Project Q&A	Bibek Chapagain, KEVA Country Coordinator, Nepal
	Presentation 4: Community Led Environmental Awareness Network (CLEAN) project, Sri Lanka Q&A	Prasad Mahindaratne, Research Assistant, Industrial Services Bureau, Sri Lanka
	Presentation 5: Swisscontact Clean Air Project, Jakarta Q&A	Veronika Rosalina, Clean Air Project – Swisscontact Indonesia
15:00 – 15:15	Coffee Break	
15:15 – 16:15	Group discussion/activities on workshop themes, e.g.: • How do you build effective stakeholder coalitions for cleaner air? • How can scientific data be more effectively in public awareness/outreach campaigns? • How do you ensure that public awareness/outreach activities lead to policy changes and behavior change?	Facilitators: Stanford Smith, Suzanne Billharz, Pierre Beaulne, US-AEP
16:15 – 17:15	Group input on upcoming project: "Personal Exposure Monitoring: A Plan for Participatory Research and Creative Public Outreach", Indonesia	Swisscontact, University of Indonesia, US-AEP Indonesia
17:15 – 17:30	Wrap-up	US-AEP and CSE

3 - PRESENTATIONS SUMMARY

Right to Clean Air Campaign

Anumita Roychowdhury, Associate Director, Research and Advocacy, and Coordinator of the Right to Clean Air Campaign, Centre for Science and the Environment, India.
CSE is a public interest research and advocacy organization focusing on the problems of environmental degradation and the urgency of sustainable development.[1]

Anumita Roychowdhury began the presentations portion of the workshop by introducing the key themes of the workshop, and providing a compelling overview of CSE's work in India to promote improved air quality. Using knowledge-based activism to generate public support and pressure the government to act has enabled CSE's Right to Clean Air Campaign to influence public opinion, change government policy and generate government action to improve air quality. The CSE Campaign provides science-backed information to build public knowledge and informed opinion that, in turn, challenges the government to act.

Roychowdhury summarized the methods CSE uses to build public awareness about specific pollutants as well as specific solutions, such as the hazards of smog and diesel particulates and the benefits of CNG and tighter fuel standards. CSE supplies science-based facts to the media to keep issues visible, foster public debate, support transparency, and build credibility. Scientific data is combined with dramatic images and messages about the health effects of air pollution.

Roychowdhury stressed the importance of building dialogue and engaging target groups. Examples include public dialogues about emissions-based taxation, emissions warranty, and vehicle inspection programs. The campaign has also provided technical support for the ongoing public interest litigation in the Supreme Court of India, helping achieve important decisions on air pollution control.

[1] For more information about the work of CSE on air quality, see their website at: http://www.cseindia.org/apc-index.html

Although CSE still faces challenges, such as low technical capacity among some civil society groups and the difficulty of sustaining public interest, the campaign has resulted in reductions in some air pollutants, and a stabilization of particulate matter. Roychowdhury stressed the need to constantly assess the impact of campaigns, refocusing when necessary and strategizing in order to carry the work forward.

Puerto Princesa City Clean Air Program for Tricycles

Ninette Ramirez, Urban Specialist, US-AEP Philippines.

Ninette Ramirez shared the experience of a US-AEP supported project in the city of Puerto Princesa on the Philippine island of Palawan. The project, although still in an early phase, has achieved measurable, significant results: reduced hydrocarbon and carbon monoxide emissions from three-wheelers in the city. Key to the project's initial success is a focus on public awareness and involvement. The leaders of the campaign, including government officials and donor groups, shared ideas and plans with numerous stakeholders during the planning and implementation phases of the campaign. Tricycle drivers themselves served as leaders in developing and supporting the Clean Air Program. Radio, TV and print materials helped launch the project and increase awareness of the health effects of vehicular emissions. These actions were effective in gaining wide support for the program and ensuring acceptance of the project's efforts to improve maintenance of three-wheelers, improve traffic management, promote adoption of more efficient technologies and enhance inspection and enforcement.

Kathmandu Electric Vehicle Alliance (KEVA) Project in Nepal

Bibek Chapagain, KEVA Country Coordinator, Nepal.

Nepal's KEVA project has raised public awareness and generated advocacy support to promote zero emission electric vehicles in Kathmandu. The KEVA approach has focused on catalyzing alliances of stakeholder agencies and organizations to plan the program, support policy and regulatory dialogue, and promote project objectives with the public and government. KEVA formed partnerships with local NGOs

to increase public awareness and strengthen the involvement of electric vehicle operators in developing policies for cleaner transportation. Key aspects of the public awareness component include:

- Supporting health impact studies, launching a media campaign, developing a resource center, and training for NGOs.
- Creating strategic alliances with local NGOs and local government agencies.
- Focusing on building awareness within key sectors, specifically the tourism industry and media.

Chapagain stressed the importance of including indoor air pollution as a significant public health hazard in public awareness campaigns, the need for NGOs and the medical community to work together to more effectively raise awareness of the health impacts of air pollution, and the value of involving the media in contributing to the project objectives via public service announcements.

Introduction to the Community Led Environmental Awareness Network (CLEAN) Project *Prasad Mahindarathne*, Research Assistant, Industrial Services Bureau, Sri Lanka

CLEAN is a nationwide program focused on environmental awareness, assessment, action and advocacy, with the objectives of involving school children/communities in environmental protection in sensitive areas and inspiring policy makers to take action on environmental issues. The concept behind CLEAN is that through awareness and understanding, these groups will voluntarily act to improve environmental conditions and comply with existing laws and regulations. CLEAN activities have included involving students in the measurement of ambient air quality in four selected cities on a weekly basis and disseminating this data via public boards in prominent places.

The project has also conducted awareness programs for selected community groups including traffic police, pedestrians, students and members of the transport sector. Key lessons learned so far are that:

- School students are effective messengers.
- Increased awareness helps to mitigate environmental pollution.
- Technology can be useful as a "second face".

Promotion of Inspection & Maintenance Systems in Jakarta

Veronika Rosalina, Clean Air Project – Swisscontact Indonesia.

The Swisscontact Clean Air Project in Jakarta provided an example of a public awareness campaign that focused on a very specific source of air pollution – poorly maintained vehicles. Begun in Jakarta, the project addressed vehicular emission mitigation, including the promotion of improved inspection and maintenance (I&M) of vehicles through outreach events (beginning in 1999). The outreach was initially focused on policymakers to increase their awareness of the need for I&M, and these activities were then expanded to the general public. The objectives were to improve awareness of the necessity and benefits (both environmental and economic) of better I&M programs, change public perception and behavior from corrective to preventative maintenance, and gain public support for greater implementation of I&M programs.

Specific target audiences were identified such as car owners, the media and workshop technicians. Activities included public relations events such as talk shows, press conferences, and distribution of promotional materials (stickers, leaflets, etc.). These activities helped to drive the issuance of a local government decree on private vehicle I&M in Jakarta, increase the number of cars being inspected, and support the official launching of a larger I&M program to the public. As a follow-up, a Clean Emission Appreciation forum was established to sustain the promotion of I&M. Members included 24 government, industrial, and commercial organizations. The lessons learned from the I&M outreach events are that:

- Direct outreach (e.g. free emission testing) was more accepted by the public.
- Involvement of a prominent public figure was necessary.
- Outreach through TV was more effective than through print materials (though TV messages much be tailor-made for certain air times and can be expensive).
- Endorsement by institutions (e.g. Swisscontact) was needed to sustain the initiative.

Recommendations to other practitioners included:

- Outreach messages must be focused and activities must be implemented in steps (from awareness to understanding to action).
- Target audiences should be segmented (e.g. car users).
- Awareness and outreach campaigns must be continued in order to sustain public attention.
- Campaigns should be coupled with activities that promote improved policy and enforcement.

Planning for Public Outreach of Personal Exposure Monitoring (PEM) Project in Jakarta *Arie Istandar (Swisscontact) and Dr. Budi Haryanto (University of Indonesia)* A joint program between the University of California at Berkeley, USAEP, Swisscontact, and University of Indonesia.

This final presentation was shared at the end of the workshop following the group discussions described in the section below. The purpose of this presentation was to provide an opportunity for the participants to discuss a project that is still under development, utilizing both knowledge gained at the workshop and personal expertise to provide ideas and input into the planning process.

The project is a new joint initiative of several U.S. and Indonesian organizations involving research, outreach and advocacy. The initial phase will involve collaboratively gathering data in a participatory manner on exposure to air pollution among specific groups of people. Through use of an innovative mobile air quality monitoring unit or "backpack," 120 volunteers will be organized into three groups (based on high, medium and low exposure to air pollution) to gather exposure data in different city locations such as in buses, along roadsides, etc. This information will be used to raise public awareness about actual exposure levels, and will be used to support analysis of current air pollution control policies.

The proposed plans for the public awareness component of the project are to disseminate the results of the exposure monitoring to specific target audiences, and get their support for improved policies and behavior changes. Anticipated activities include a road show, press conferences, radio talk shows, a documentary film, focus group discussions, and development and dissemination of advocacy print materials.

Following the presentation, additional feedback from the group was requested although the presenters indicated that they had already gained many ideas about how to improve the public awareness component of the project based on the workshop presentations and discussions. Ideas from the workshop participants included the suggestions that the team recruit celebrities or well-known politicians to participate in the project (e.g. by volunteering to wear the monitoring device). This could generate substantial media coverage, and potentially provide a "champion" for the project. Several people felt that the longer-term objectives and expected outcomes of the project needed to be clarified. Although there was not sufficient time to thoroughly discuss all aspects of the project, several individuals expressed interest in the novel approach of the project, and further communication is planned among interested parties.

NOTE: Please contact the presenters for complete copies of any of the presentations summarized above. Contact information for presenters and participants is provided in the Appendix below.

4 - RECOMMENDATIONS FROM GROUP DISCUSSIONS

After the presentations and a question and answer period, three break-out groups were organized. The groups were arranged to include a mix of representatives from NGOs, government, donors, media and other air quality management practitioners. The discussion groups were based on the three major themes for the workshop:

- How do you build effective stakeholder coalitions for cleaner air?
- How can scientific data be used more effectively in public awareness/outreach campaigns?
- How do you ensure that public awareness/outreach activities lead to policy changes and behavior change?

After each group discussed potential answers to these questions, a summary of each group's conclusions and recommendations were shared in the final plenary session. A summary of the outcome of each group's discussion is provided below as provided by the respective facilitators.

4.1 Summary of Group 1 Discussion: "How do you build effective stakeholder coalitions for cleaner air?"

Facilitator: Pierre Beaulne

Participants in this group shared their thoughts on how best to build effective coalitions, drawing upon successful approaches they have used. The group then synthesized the discussion into key recommendations for groups attempting to build and sustain coalitions working towards cleaner air. The key recommendations included:

1) **Identify Potential Stakeholders:** The initial phase of developing an effective coalition should involve identifying and bringing together the broadest possible group of interested stakeholders.

2) **Identify a Common Objective:** It was noted that the diverse representation within coalitions, inherent in their nature, requires a common interest to bind their efforts. A key element to finding a common objective involves active, genuine listening to the views of others.

3) **Establish a Representative Working Group:** Since some coalitions may be quite large, it was suggested that a representative working group (endorsed by the coalition members) be established to carry out the efforts underway.

    a. The Working Group (WG) should be tasked with developing a proposed plan to effect desired changes for endorsement by coalition member groups.
    b. Following endorsement of a plan, the WG should assign responsibilities to carry out the efforts – not necessarily only among WG members, but also including other coalition members.
    c. The WG should monitor and review the plan, as required.

4) **Prioritizing Issues:** Throughout the process of developing and implementing a plan it was noted that there will be times when a coalition member's particular interests may not be deemed a priority. It was recommended that these issues be addressed and integrated into future efforts in order to sustain the coalition's cohesiveness.

5) **Working Cooperatively:** The need to recognize different interests and agendas while working cooperatively was emphasized.

6) **Utilizing Media:** While the use of media to build coalitions was not explored exhaustively, it was noted that a two-way relationship exists that must be understood and used effectively to enhance the efforts of a coalition.

4.2 Summary of Group 2 discussion: "How can scientific data be used more effectively in public awareness/outreach campaigns?" Facilitator: Suzanne Billharz

The results of this discussion group are summarized into a set of priority recommendations followed by key comments generated from the discussion, and finally a list of some special challenges. The group developed two main recommendations to use scientific information more effectively in campaigns:

1) **Source scientific information and ensure that the information is thoroughly understood before defining campaign goal(s).**
    - It is useful to develop a network of experts, both individuals and institutions, to help identify and understand scientific data. Institutions may include scientific, medical, corporate, government, academic or NGOs.
    - The process should include ways to link science with analysis and improvement of current policies, building of public awareness, and ultimately the development of an action plan to remedy weak policies.

2) **Communicate science to different target groups.**
   - Identify target groups and design appropriate outreach materials. Target groups may include the general public, policymakers (executive, judicial, and legislative), industries, students and media.
   - Outreach mechanisms:
     - Keep messages simple, consistent and provocative.
     - Outline the problem, define costs and options, and provide solutions.
     - Enable the judiciary to act.
     - Show that protecting the environment makes good business.
     - Raise awareness through participatory and/or voluntary methods and through school curriculum.
     - Develop stories for use in the campaign.

The general group discussion produced the following comments/advice:

1. Keep things simple. This includes using simple language in the campaign message(s) and attempting to relate the message(s) to personal experiences of the target audience.

2. Segment the target audience in order to develop appropriate campaign strategies.

3. Test the message first, often called "shadowing".

4. Use science strategically for campaigns based on needs.
   a. Source scientific data to help establish credibility for the development of a subsequent action plan:
      - Use NGOs that have mixed skills – balance research and communication.
      - Develop networks of scientists and other experts on air pollution and public health.
   b. Set targets that are measurable and that are linked to science.
   c. Tailor the message(s) to policymakers and to stakeholders.
      - Once attention is obtained from target groups, continue to feed them with more scientific data to sustain the drive for policy changes as well as awareness raising.

In the discussion group, participants from Indonesia and Sri Lanka also shared their experiences in using scientific data in campaign programs. For example, a representative from the University of Indonesia indicated that:

- Local scientific data (from Indonesia) is important. Policymakers respond to it, while they tend to not respond to data from other countries.
- It is important to communicate to teachers and parents as well as scientists and researchers.

Participants from Sri Lanka meanwhile noted that:

- Because participants may be giving up their work time to help in a program or campaign, they need to see immediate results/benefits of their participation in order for them to continue their support
- It is useful to give police face masks, and give schools information.
- It is important to provide incentives.
- It is useful to use filter paper to illustrate air pollution from particulate matter.
- Air quality and epidemiological evidence are needed.
- Separate institutions should gather air quality and health data, but the important step is correlating these factors.

The group also noted special challenges that may need to be addressed:

- How to use science to fight misinformation?
- As technology evolves and deeper technical understanding is required, how to manage and "repackage" information for the general public to ensure that public outreach is properly addressed and maintained?
- How to obtain and sustain funding for communication and outreach?

4.3 Summary of Group 3 discussion: "*How do you ensure that public awareness/outreach activities lead to policy changes and behavior change?*" Facilitator: Stanford Smith

The group discussion began with each participant describing how he/she would answer the question based on his/her personal experiences. After listing the various answers to the discussion question, the group then tried to reach consensus on five key strategies to ensure that awareness/outreach campaigns actually result in policy changes or behavior change, and consequently improved air quality. The main recommendations were:

1. The campaign should **link air pollution to human health**. This helps personalize the message and make it more relevant to individuals. It can be done in a variety of ways, from testing blood lead levels, for example, to disseminating the results of research studies around the world on the health effects of air pollution. There are many sources of information, such as the Health Effects Institute in the USA.[2]

2. Programs should **demonstrate alternative solutions**. It is more likely that people will act on air pollution issues if viable new solutions are demonstrated. It's easier to see what is possible if an example is seen or explained: for example, viable mass transportation projects like bus rapid mass transit systems in Colombia, clean fuels (CNG in Delhi), or alternative low-emission or zero emission vehicles (in Nepal).

[2] For more information see: www.healtheffects.org

3. It is important to not just increase awareness, but **develop public pressure**. Keeping in mind the process of moving from "awareness" to "understanding" and then to "action," campaigns must move beyond raising awareness to promoting specific actions. Some campaigns, for example, specifically ask the public to lodge complaints with the government, or events are organized to demand specific changes to policy or improvements in implementation of laws and regulations.

4. An effective way to ensure action is to **build coalitions, networks, and institutional partnerships**. These may include civil society groups, industry associations, prominent figures, the media, medical professionals, etc. A good example is the Coalition for Unleaded Gasoline (KPBB) in Indonesia. KPBB's campaign coordinated with an unlikely coalition of government, private sector and NGO players to pressure the Indonesian government to phase out leaded gasoline.[3]

5. **Use of the mass media** can be very effective, particularly TV, and particularly during prime time if it is feasible (though sometimes it is not because of the cost). Opportunities to leverage free or discounted media space are useful – it is often possible to get information put into news programs, for example. Journalists and other media representatives should be involved in campaigns from the beginning if possible to inform them of the campaign objectives and rationale, and also get media input and assistance with communicating messages.

In addition to these strategies, many additional responses related to this question/issue were shared at the workshop, including the following recommendations:

- Campaigns should be **focused and issue-oriented**. The more focused the campaign, the more likely it is that a result can be achieved.
- Awareness **campaigns should have a scientific basis**. This provides credibility, but the information must be shared in a way that can be understood by non-scientists.
- It can be more effective if the program/campaign **focuses on specific policymakers, political bodies and industries**. Individual politicians, for example, can be strong advocates to influence other policymakers or the general public, or directly change policy or improve/enforce implementation of existing regulations/laws. Focus on specific industries such as automobile manufacturers, bus companies, three-wheeler drivers or fuel producers as partners, and show potential benefits to their industry to increase their motivation. Alternately, highlighting the causes of air pollution from specific industries can result in pressure to improve standards and make companies more accountable for air pollution.

[3] For more information see: http://www.kpbb.org/index_e.htm, and www.usaep.org/accomplishments/countries/indonesia.html

- In order to assist with policy development, it can be useful for NGOs or other interested organizations to **develop draft policies or position papers** to share with policymakers and other stakeholders. These position papers are often used as a beginning or basis for actual policy.
- **Dialogue with the government** can be very useful. Government should be seen as a key stakeholder and not always as the "enemy." Often collaborative efforts are more effective, though this is not always possible. Involve law enforcement representatives when undertaking policy dialogues.
- For campaigns to be effective, it helps to **dramatize the issue** – use tactics such as a "human chain" for example, or visual representations of the effects of air pollutants on unborn children. Events can be organized to publicize a program's objectives.
- **Recruit a "champion**" – a popular figure such as a politician or singer/actor that will support your campaign and provide a tool for raising greater public awareness and influencing policymakers.
- **Focus on both the harm of air pollution and the potential benefits** from improved air quality. Both incentives and disincentives may be needed depending on the circumstances and the individuals/groups involved. For example, government incentives to switch to cleaner fuels or cleaner technologies can improve the adoption of these cleaner options. When governments more fully understand the health costs and risks associated with air pollution, they may be more likely to act in a preventative way.
- It can be effective to **involve polluters** such as the automobile industry, three-wheeler drivers, or the gas and oil industries in your program. Quite often these stakeholders are more open than expected to supporting greater awareness and cleaner air initiatives. For example, some car manufacturers build in advanced catalytic converters, and low quality fuel can damage these converters, so they are motivated to advocate that governments implement or enforce higher quality, and thus cleaner, fuel standards.

5 - EVALUATION SUMMARY

An evaluation form was completed by participants at the end of the workshop. The evaluation form sought to:

- Find out if the workshop proved useful for the participants;
- Identify which topics were most relevant for participants; and
- Identify topics that were not covered and which participants would like to see covered in any future workshops.

1. The first evaluation question asked participants was, "*Did you find this workshop useful? Why or why not*?" All responses were positive. It is clear from the comments that the workshop provided a unique opportunity for learning and sharing among practitioners, advocates, media representatives, and project managers. Responses to this question included the following:

> "Yes, especially the discussions. I found recommendations that can actually work through the experience of other countries/cities."
>
> "I found the workshop extremely useful. Most of the presenters are from our region, and more or less equal in socio-economic context. So that sharing of experiences was very worthwhile."
>
> "Yes, a very good way to conduct regional consultation and regional networking."
>
> "Very useful, especially for bringing out the relevance of civil society action and its specific role."

2. The second question was "*What topics of the workshop were most relevant to your work*?" Comments were varied but the vast majority felt that one or more of the topics was relevant to their work. Although there was no single topic listed by a majority of participants, the most common responses were:

- Building effective stakeholder coalitions;
- How to use public awareness to bring about changes in policy;
- How to use communication to bring about behavior change;
- The idea of a "right to clean air."

3. The third question was "*Are there any public awareness topics or issues which you would like to see addressed in future workshops*?" Again, responses varied, and no one topic was selected by a majority of participants. Some of the most common responses were:

- How to develop a media strategy.
- Funding/sustainability issues.
- How to measure public perception or effectiveness of a campaign on air pollution.
- Fuel alternation and its effects on air pollution.
- Ways to get governments involved.

A final section asked for any additional comments. Most participants had no further comments, and of those that did, many were favorable assessments of the usefulness of the workshop. Some participants indicated the need for more time to really address all the relevant aspects of public awareness campaigns and air pollution. A full day program was suggested and there were a few specific requests for "continued discussions/consultations" and more "sharing of successes and failures."

Based on discussions with participants following the workshop, it appears that none of the participants had previously participated in any kind of regional training or dialogue on this issue. Most operate in relative isolation, focusing on local challenges. The opportunity to share experiences and recommendations, and compare initiatives was clearly appreciated, though a half day workshop was not sufficient to adequately cover the topics of interest to the attendees.

6 - POSSIBLE FOLLOW-ON ACTIVITIES

Based on the discussions, evaluation results, and comments that were shared at the workshop, it is apparent that there is a high level of interest among the participants in this type of regional information sharing, and that there is a strong desire for building upon this initial workshop through additional training and networking. While some participants already have started to develop more formal communications, and in one instance a study exchange is being discussed between representatives of two projects, much more could be done to facilitate dialogue, share expertise and knowledge, and support the growing number of public awareness initiatives in the region focused on air quality.

The option most commonly requested was a follow-on regional workshop of 1-2 days providing more in-depth training, opportunities for sharing experiences, and additional discussions on communications and public outreach strategies to improve air quality. Topics for more in-depth training and discussion could include:

- Developing media partnerships, planning effective strategies to involving the media, and evaluating the cost effectiveness of various mass media options.
- How to measure health impacts from air pollution, and how to most effectively use health data to increase public understanding of health risks/consequences.
- How to work with governments, and/or deal with them to ensure development of better policies/regulations and enforcement of policies/regulations.

Another option that was mentioned, but which would require greater resources and time is development of a structured regional network of practitioners. This would be of great benefit to the currently isolated projects currently underway, but would require the support of a regional organization or mechanism and commitment at the various country levels. At minimum, this could be a topic of discussion if another regional workshop on public awareness campaigns and air pollution is undertaken.

APPENDIX: LIST OF PARTICIPANTS

Approximately thirty five persons attended the workshop from nine countries. The Exchange Program for Sustainable Growth (EPSG), a mechanism of US-AEP administered by the Institute for International Education, provided financial assistance for many of these participants to attend the workshop and the subsequent BAQ conference. Contact information is provided where available.

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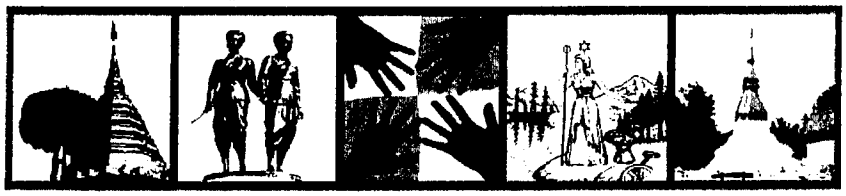
Public Participation

Techniques and Practices for Thai Municipalities

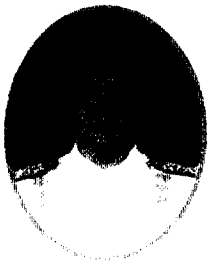
CityLinks



Khon Kaen
Chiang Mai
Phuket City
City of Portland, Oregon USA

International City/County Management Association (ICMA)
US Agency for International Development (USAID)
US-Asia Environmental Partnership (US-AEP)

Letter from the Mayor of Khon Kaen



Rapid urbanization and population growth bring continuous and dynamic changes. This creates problems and various needs that increase the complexities in the Thai way of life. It is no longer sufficient for the people to look to the central government or parliamentary representatives exclusively to solve problems. It is incumbent on municipalities or units of local government to look after the welfare of people in their communities. Local government must also implement state policies effectively. Local authorities must adjust their visions and perspectives in order to create cultural values consistent with the existing and changing situation. Local administrators do not have complete power to unilaterally make decisions impacting the community. Local politicians should understand that they cannot act on behalf of the people in every area. Their election only means the majority of voters have selected them as a representative. These politicians still need to gauge and conduct periodic surveys of the community's opinion. In a democracy, the power to decide must ultimately belong to the people. Constitutionally, decentralization does not mean that final authority belongs to local government. Decentralization only allows local government to act as the agent of the citizenry. Citizens still own their community and in the future they will fully participate in the deliberation and decision-making in the process of self-government.

The essence of government is decentralization
The essence of decentralization is the people

Mr. Peerapol Pattanapeeradej
Mayor of Khon Kaen

Letter from the Mayor of Chiang Mai

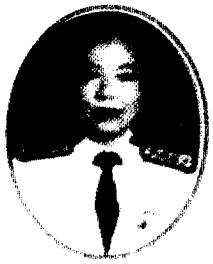
Local government organizations in Thailand have welcomed the opportunity to join the co-operative project under the auspices of ICMA, USAID and US-AEP. The project aims to develop and disseminate techniques of public participation to local organizations, especially when involving sustainability of the environment.

To promote public participation, the City of Chiang Mai will encourage citizens to make comments, participate in planning and decision-making on landscape improvements along the bank of the River Ping with the goal of beautification, improvement, sustainable environmental protection and financial transparency under the principle of good governance. We want to create powerful community strength, through networking of the various community groups. By joining collective forces we can create a Chiang Mai that belongs to all the citizens.

Finally, I truly hope that the multi-city relationship among the cities of Phuket, Chiang Mai, Khon Kaen and Portland will create systematic learning in order to sustain development and respond to the needs of all of Thailand's citizens.

Boonlert Boonupakorn
Mayor of Chiang Mail

Letter from the Mayor of Phuket



The City of Phuket has taken part in the building of a multi-city relationship with the cities of Chiang Mai, Khon Kaen and Portland, Oregon under the auspices of ICMA, USAID and US-AEP. The former mayor of Phuket, Lieutenant Bhumisakdi Hongyok, initiated the partnership on June 26, 2003. The City of Phuket has greatly benefited from the valuable experiences, especially in fostering citizen participation in city projects by focusing on two activities: 1) strategic planning to improve the Klong Bang Yai landscape; and 2) sustainable protection of the environment through sound financial measures and good governance. Furthermore, the City of Phuket staff has learned many valuable lessons from the partnership and has applied the knowledge in practice.

All the lessons collectively learned by the four cities have been recorded in this Public Participation Manual. I hope it will lead the way for civic leaders and interested parties to put them into practice throughout all of Thailand.

Ms. Somjai Suwansuppana
Mayor of Phuket

Acknowledgements

We would like to thank Ms. Nattawan Thangvijit, a former Vice President and Manager of International Trade Finance, Bank of America Oregon, USA, who supported and helped to translate portions of this manual into English. We would also like to thank Professor Dr. Nantawat Poramanun from the Faculty of Law, Chulalongkorn University, for allowing us to include his article about public hearings in Thailand as an appendix to this manual. Special thanks also go to USAID/US-AEP officials Mr. Orestes Anastasia, Dr. Piyachat Pradabraj, Ms. Napaporn Yuberk and Ms. Supattira Rodboontham for their tremendous support for and coordination of this project.

We would also like to thank the International City/County Management Association (ICMA) for permission to adapt previously prepared ICMA materials for use in this manual.

Editors

City of Khon Kaen
City of Chiang Mai
City of Phuket
City of Portland

August 2005

Preface

This manual has been published with funding from the United States Agency for International Development (USAID), under the auspices of the International City/ County Management Association (ICMA)'s CityLinks Program and the United States-Asia Environmental Partnership (US-AEP). Through the CityLinks program, the Thai cities of Phuket, Chiang Mai and Khon Kaen partnered with the City of Portland, Oregon.

The purpose of this manual is to disseminate information and examples of public participation techniques to local governments throughout Thailand. With technical advice from the Portland team and environmental officers of US-AEP, the manual has been developed by applying the experiences learned by the three Thai municipalities through the course of the CityLinks partnership. The techniques in the Thai translation of this manual are the same as those described in the English version, but with permission from ICMA the editors from the three participating Thai cities have adapted the contents to better fit a Thai audience.

The CityLinks Program fostered a productive partnership between Portland, Oregon and the municipalities of Phuket, Chiang Mai, and Khon Kaen, Thailand. The goal of this program was to build experience and expertise in public participation for municipal projects; further, the goal was to improve the effectiveness of local government service delivery and strengthen democracy through municipal partnerships. The three municipalities each initiated a public participation process for two projects: a city development project, and a project in which a user fee was established for municipal wastewater management.

City development projects: Each city selected a development project to integrate solutions related to environmental issues such as private encroachment into public areas, land use and environmental management, and economic and community development. Other project goals included fostering entertainment and tourism activity. Each of the municipal projects included a public participation process, in which the public was invited to share their opinions on the planning and design of development in the improvement areas.

The development project areas are as follows:

1. The Municipality of Khon Kaen selected the Rama Theater district for redevelopment. This is a deteriorated area in the middle of the city. Plans are to design and redevelop this area into a vibrant commercial district linked to the public market.

2. The Municipality of Chiang Mai selected the area along the riverbanks of the Ping River, at the Katkaram Temple. Plans are to improve the landscape and infrastructure to enhance public access and area aesthetics.

3. The Municipality of Phuket selected the Bang Yai Canal bank for improvements to address problems with private encroachment, which have affected the drainage system and water quality. Plans are to expand the greenspace along the canal for entertainment, improved public access, and to improve water quality.

Wastewater fee projects, using public participation: Community expansion and urbanization have led to a number of environmental problems in all three cities – especially related to wastewater management. Municipalities must expend huge portions of their budgets to manage wastewater treatment each year. Enabled by government policy (Section 96, the "polluter pays principle" in the Enhancement and Conservation of the National Environmental Quality Act B.E. 2535), municipalities may now impose a wastewater management fee on system users. Through public participation, the municipalities aim to raise community awareness about natural resource conservation and water quality, and encourage pretreatment that will reduce the cost of wastewater management. With a wastewater fee in place, municipalities can benefit by being able to reallocate financial resources to other public services.

From the experience and technical knowledge in public participation gained through this project with the City of Portland, the administrator of the City of Khon Kaen (one of the manual's editors) hopes to spread the learning experience, knowledge and skills to other municipal officials as well. With this in mind, the Thai municipal representatives have developed this manual to use as a training document after the conclusion of this CityLinks partnership in September, 2005. The manual intends to offer a systematic working process and step-by-step guidance to assist Thai municipal governments with effectively engaging the public.

This manual was collaboratively developed from May to August, 2005 with Portland city administrators, Mr. Ron Bergman and Ms. Deborah Stein, who spent one week in Thailand with the Thai staff to develop the outline and contents of this manual, with continuing consultation via email through publication.

Last, but not least, we sincerely hope that readers will add their own knowledge and techniques to apply and create a new dimension of city management for local governance.

Editors

City of Khon Kaen
City of Chiang Mai
City of Phuket
City of Portland

August 2005

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Appendices

1. Introduction

What is Citizen Participation?

Citizen participation is any process through which citizens influence public decisions that affect their lives and the lives of other citizens. The participation can be active, as when citizens interact with their elected officials or the staff of a local government to influence a public policy decision. The participation can also be comparatively passive, as when citizens simply attend a public meeting to receive information on the status of a new government program or when they show up to vote at an election.

The most effective citizen participation brings people together to learn and discuss as well as to give their input, and these opportunities are particularly useful for building a consensus that can be a meaningful guide for government action.

Why Should Municipalities Involve Citizens in Local Government Decisions?

- **To build a stronger understanding of community needs, perspectives and priorities.**

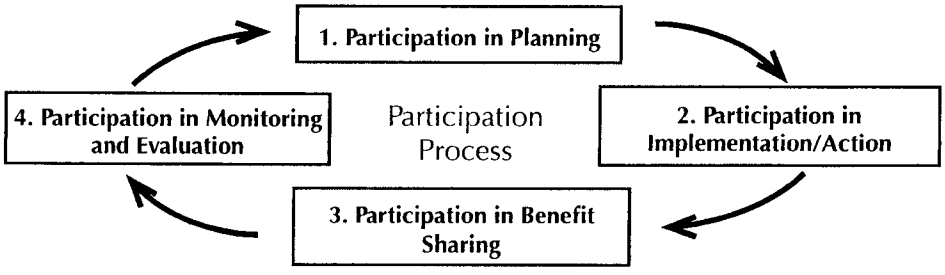
  Solutions can be better designed to meet the needs of the public when the public is consulted at early stages of problem identification, and then throughout the planning and decision-making processes.

- **To build community "ownership" of problems and solutions.**

  Solutions are more durable over time when the public feels invested in them. When members of the public feel included and listened to, they are more likely to feel invested in the outcome of the decisions that are made.

- **To carry out the principles embodied in Thailand's 1997 Constitution.**

  Local governments are now mandated to engage the public in all phases of civic decision-making, from the planning phase through implementation, benefit-sharing and project monitoring and evaluation.



The Purpose of this Handbook

This handbook introduces citizen participation principles, techniques and practices to municipal leaders and staff to incorporate into government programs, projects and activities.

Designed to be practical, this handbook includes explanatory text, graphics, and a selection of examples that illustrate how these techniques have been put to use in three Thai cities: Khon Kaen, Chiang Mai and Phuket. Appendices provide more detailed how-to information, including checklists to help with particular techniques and meeting or event preparation.

2. Getting Started

Identify Your Objectives for Involving the Public

To select the most appropriate approach to citizen participation, it is important to identify your objectives. Typical objectives are to:

- **Inform** the public about municipal initiatives and keep citizens informed as they take part in the decision-making process;
- **Educate** the public about a problem, or the rationale for a municipal initiative, and the advantages and disadvantages of various alternatives;
- **Solicit information** from the public to augment other sources of information;
- **Consult** with the public to learn what they know and how they feel about a municipal problem or initiative;
- **Involve** the public in planning to develop program goals, strategies and visions for the future;
- **Obtain responses** from the public about the impact of a municipal initiative on them or their neighborhood;
- **Provide feedback** on how public responses were considered; and/or
- **Involve members of the public directly** in decision-making through participation in on-going committees.

Once your objectives are clear, it will be easier to determine which outreach and involvement techniques will be most effective.

Some Basic Principles of Citizen Participation

The goal of citizen participation is to develop effective citizen-municipality collaboration on a project or process. To be successful, it is critical that all parties involved convey their respect for each other and for the value of citizen involvement and citizen-municipality collaboration in general.

The following strategies will ensure more successful citizen outreach and involvement:

- **Plan, plan, and plan ahead.** Few things are more frustrating than being asked for feedback or involvement without enough time to respond. It can feel disrespectful, as if the participation is not really wanted or valued. Make sure there is enough time built into your public process to provide citizens with a meaningful opportunity to participate.
- **Explain the process, expectations, and time lines up front.** When you communicate with citizens during an outreach and involvement process, clarify early on what you expect from them and what citizens can expect from you. Clarity will help avoid frustration and unrealistic expectations.
- **Go to the people**. When setting up public meetings, look for locations that are convenient to the people most affected by the project whenever possible. Generally you will have better attendance and people will feel more comfortable when meetings are located in familiar and convenient settings.
- **Demonstrate that you are listening**. At public meetings, record the public's comments on flipcharts – this technique provides you with a useful written record of the feedback that you receive at the meeting, and at the same time, visibly conveys that you are taking people's comments seriously. As the project progresses, describe how citizen participation has helped to shape and influence the process and project outcomes.

The City of Khon Kaen has identified nine guiding principles regarding public participation:

1. Mutual respect
2. Teamwork
3. Knowledge and ability
4. Coordination
5. Cooperation
6. Respect for differences
7. Leadership
8. Patience
9. Positive attitude

STARTING OUT RIGHT:

A Five-Question Checklist

Use this checklist as you begin to plan a public involvement effort. It is designed to jump-start your thinking, help you make sure you haven't overlooked anything significant, and help you clarify your goals for the outreach project. Once your goals are clear, it will be much easier to determine which outreach and involvement strategies will be most effective.

1. **What is the goal of your public involvement effort?**
   - What will be different if the effort is successful?
   - What are you trying to achieve with the effort? How does the effort help fulfill your municipality's mission?
   - What are the key objectives of the involvement process? Are they measurable, specific, and achievable?

2. **Who are you trying to involve?**
   - What specific group or population will be affected by the proposed program or project?
   - Which other groups will have related concerns? For example, is there another government or private agency whose partnerships should be sought?

3. **What information do you need to share?**
   - In order for citizens to provide informed, thoughtful input, how much of an educational effort is needed? In many municipal decisions there is a need to inform or educate citizens about technical or other complexities inherent in the issues. To get thoughtful citizen input and perspective, municipal staff may need to prepare and present background materials. Take care not to assume the average person knows all about the proposed action.
   - What is the most effective and efficient way to communicate that information?

4. **What kind of involvement/input do you want from citizens? For example, is the emphasis on *informing* or *involving*?**

   - If the emphasis is on informing, don't use a process designed for feedback collection.
   - If the emphasis is on involving, think carefully about when and how citizens should be involved. Consider if you want citizens to:
     - Generate initial ideas?
     - Get feedback? (For example, what should a new program include? It may not be appropriate to ask if the program should be done, but the public can help shape the program.)
     - Review and comment on a document draft? A final version?
     - Develop recommendations, approve recommendations, or suggest modifications?
   - Are there different phases in the project during which there are different types of opportunities for citizen input?
   - How will you receive input?
   - What process will be used to review and act on the input when you receive it?

5. **What type of resources are needed and how much time is required?**

   - What staff resources will be required? Have you arranged for the resources to be available for your project?
   - How much time and effort is expected of involved citizens? Are you prepared to communicate clearly to citizens regarding time commitments, meeting dates, and other issues so that citizens who wish to be involved can be well supported in making the effort?

3. Overview of Citizen Participation Techniques

The term "technique" is used in this handbook to describe any method planned by a municipal government to inform, educate, or solicit the assistance of citizens in planning and decision-making.

Public Education and Information

When the intent is to educate and inform citizens, but not necessarily to obtain their ideas and opinions, you may choose to initiate a public information and/or public education program.

- **A public information program** can include posters, pamphlets or newsletters to inform citizens about the activities of municipal government. A program can also include the use of media, including newspaper, radio and/or television, to provide information to the public.

  Well-informed citizens are able to participate in municipal activities more effectively, so a quality information program can be a good investment and will help establish a strong foundation for citizen involvement in decision-making. To be effective, public information must be perceived as objective and accurate, or the credibility of the municipality may be compromised.

- **A public education program** can bring municipal officials directly in contact with citizens; for example, talking with students in the classroom about improving water quality in a local river.

Examples of Information and Education Techniques:

- Posters, pamphlets and newsletters
- Websites
- Media releases
- Classroom presentations
- Community fairs
- Displays in public places
- Public address systems
- Banners and floats

See Appendix C for more information about using media.

Involving Citizens in the Decision-Making Process

A decision to consult with the public to obtain ideas and feedback about a municipal issue or project will require more participatory techniques. Table 1 summarizes several techniques, and Table 2 matches the techniques to the intended purpose. More detail about these techniques, including advantages and disadvantages of each, can be found in Chapter 7.

The public can provide valuable help...

- As you gather background information to understand existing conditions, challenges and opportunities
- As you establish criteria for a successful outcome
- As you test possible solutions

Table 1: Summary of Techniques to Involve Citizens in Local Decision-Making

(See Chapter 7 for more information about each technique)

TECHNIQUE	DESCRIPTION	WELL SUITED FOR:	LIMITATIONS	EXAMPLES OF USE
Town Hall Meeting	Informal assembly usually held in a public gathering place (recreation building, school, temple) for citizens to provide comments on a proposal or issue	Providing a less formal opportunity to present proposals and hear public response	Logistics of setting up and conducting a meeting outside city hall may be difficult. Not well suited for educating citizens about complex issues	Collecting feedback on proposed capital improvement program in specific geographical area
Advisory Committee and Task Force	Group of citizens appointed to provide advice on issue(s); may be on-going or, in the case of a task force, focused upon a single issue	Inviting feedback at several points throughout a project; testing ideas early before developing formal proposals; gaining support for proposals from community and business leaders; resolving conflicting interests	Requires significant staff time for preparation, citizen training, participation and meeting follow-up; some groups may want to set project direction rather than provide advice; roles need to be carefully defined in advance	Investment committee to suggest alternatives for investing unused cash
Public Workshop	A participatory session to enable public brainstorming, priority-setting and/or creative problem-solving	Identifying shared concerns and priorities; enabling different interests to be heard and discussed; inviting creative feedback; and providing a forum for small discussions	Requires significant staff time for workshop design, preparation and follow-up; requires skilled facilitation for small group discussions to be effective	Developing a shared vision for the redevelopment of a central business district
Open House	An open period of time for friendly and informal interaction with staff to share information through interesting visual displays. Citizens drop in anytime during a designated time period	Providing an opportunity for citizens to learn about a project at their own pace and talk with staff in an informal setting	Requires significant time for preparing clear, understandable displays and educational materials	Display of several alternative designs for a park project
Walking Tour	An active, participatory opportunity to provide information and ask for ideas about a physical place	Promoting a shared understanding of critical issues between municipal staff, local residents and business owners	The number of participants in any one tour may be limited	Evaluating alternatives for improving the design of storefronts in a business district

Note:
Public hearings are another form of public meeting not covered in detail in this manual. Typically structured and formal, public hearings allow citizens to provide comments directly to a decision-making body (such as a City Council). Public hearing requirements for Thai local governments are now being drafted by the Office of the Prime Minister.

Table 2: Matching Techniques to Your Intended Objective

(Refer to Chapter 2 for a discussion of possible objectives for a citizen participation process)

TECHNIQUE	OBJECTIVES						
	To Inform	To Educate	To Solicit Inform-ation	To Consult	To Involve the Public in Planning	To Obtain and Provide Feedback	To Foster On-going Interaction
Town Hall Meeting	•	•	•	•		•	
Advisory Com-mittee And Task Force	•	•	•	•	•	•	•
Public Work-shop	•	•	•	•	•	•	
Open House	•	•	•	•	•	•	
Walking Tour	•	•	•	•	•	•	

4. Educating the Public

In any public involvement process it is important to educate the public so that citizens are able to fully understand the range of issues, the public trade-offs of various policy options, and the viewpoints and concerns of various stakeholders.

Often, the basic questions and issues associated with a project may be raised through news articles. However, news articles rarely provide the level of detail necessary to prepare the public to offer informed comments on options and alternatives. There are a variety of ways to provide basic information to citizens so they can participate in a civic decision-making process in a meaningful way.

Framing the Issues

Once key stakeholders are identified, they can be invited directly to a public meeting to learn more about a proposed project or program. This invitation should outline the key problem and major alternatives. The invitation can also describe the implications of each alternative if it is not a complex issue. If the issue is particularly complex, however, it may be necessary to simplify the large issue into smaller sub-issues and to conduct separate meetings or processes for each. For example, a large issue might be broken down into the following kinds of questions:

- Here are some facts... do we have a problem?
- If we agree we have a problem, do we want to fix it?
- If we want to fix it, what are some alternative solutions we should consider? What are the implications of each alternative solution?
- In selecting the solution from the range of alternatives, what criteria should we use to determine the best approach?
- Of the alternatives under consideration, which one best fits the selected decision criteria?

By breaking the issue into a set of questions such as these, the decision-making process becomes more manageable.

Techniques for providing information

- Open houses, community fairs, and displays in public places
- "Background reports" that describe context, issues, and options without making recommendations

- Walking tours
- Informal stakeholder meetings as preparation for larger general public meetings
- Media specials or in-depth reports
- "Blue Ribbon" citizen study groups that report findings to the public
- Attending regular meetings of stakeholder groups or civic clubs and describing issues and problems, with an invitation to participate in a general public process

There are lots of alternatives and many of these can be combined or tailored to fit the particular issue or set of stakeholders. There is not a cookbook approach that works for every situation or municipality, and nothing can replace knowledgeable decision-makers who know the community and can help design the most effective approach.

5. Time and Resource Requirements

Citizen participation efforts require time and resources (personnel and operating) to be effective. Consider the following time needs when planning your citizen participation program.

Schedule of events

- Develop a clear and concise schedule of events at the beginning of your project.
- Include major milestones and decision points in your schedule.
- Provide a variety of activities in which citizens can participate.
- Communicate changes to all interested parties as far in advance as possible.

Lead-time

- When involving organizations in your citizen participation program, recognize that organizations rely on voluntary resources and that they typically meet infrequently (e.g., monthly). Therefore, internal communications between members may be slow. Provide organizations ample time to circulate materials and coordinate responses among members.

Coordination

- Citizen participation introduces an added workload for organizations composed of volunteers. Citizen participation activities should be coordinated by municipal staff to respect the time of volunteers and minimize the burden on participating individuals.

6. Limitations of Citizen Participation

A Valuable Tool but No Panacea

Citizen participation is a tool for improved planning and decision-making. It should not be regarded as a solution to municipal government's problems, but rather an important contributor to solving problems so that the problems *stay* solved. Citizen participation is a complement to existing decision-making processes, not a substitute.

When local government is isolated from the public, citizens may come to regard their officials with suspicion and mistrust. Breaking down these barriers takes considerable time to inform citizens, familiarize them with how government works and the issues facing municipal government, and involve citizens in resolving problems that are of direct concern to them. To overcome the cynicism and distrust that so often characterizes the relations of citizens with their public officials, it's necessary to consistently reinforce the value of citizen views and ideas in municipal decision-making.

There are several ways to get maximum value from the involvement of citizens:

- Find opportunities to encourage positive and healthy interaction among citizens, particularly when there is a climate of suspicion and distrust.
- Bring people together in familiar surroundings to make them feel comfortable.
- Use simple language citizens can understand to explain the issues and what is expected of them.
- Show citizens that their involvement is important and will make a difference.

Obstacles

There are obstacles to the implementation of an on-going effort to involve citizens in local government activities. Of course, citizen participation programs can be costly and time-consuming (for municipal government and citizens alike). An even more serious barrier is the threat citizens pose to established ways of doing things. The involvement of citizens may be resisted in governmental activities that in the past were the sole responsibility of elected officials or bureaucrats. The threat is most pronounced where the involvement of citizens is linked with a shift toward decentralized decision-making.

A word of caution for local governments that have not involved citizens in the past: move slowly into citizen participation by first involving citizens in areas of activity that pose little threat to existing power bases.

Finally, don't expect too much from citizen participation. It is no guarantee that any decisions reached by a citizen's group will satisfy the expectations of all citizens. Citizen participation permits different views to be heard and discussed through an open process, but the mayor and city council will generally make final decisions.

7. A Closer Look at Citizen Participation Techniques

This chapter provides more detail about the citizen participation techniques summarized in Table 1:

- Town hall meetings
- Advisory committees and task forces
- Public workshops
- Open houses
- Walking tours

For each technique, this chapter offers a definition and purpose, a description of the process, and a summary of advantages and disadvantages. The chapter also provides brief examples to illustrate how each technique has been successfully used by a Thai municipality.

Please note that public hearings are another form of public meetings that will soon be required by the law of Thailand. The regulations governing public hearings are now being drafted by the Office of the Prime Minister. Public hearings in Thailand are discussed in Appendix G.

A. Town Hall Meetings

Appendix E contains a checklist for municipal officials on how to set up and conduct a successful town hall meeting.

Definition and Purpose

Town hall meetings are designed to provide information and solicit citizen comments on proposed local government actions, policies, or projects that may affect the public. Meeting dates and times are coordinated with local residents. To encourage an informal atmosphere, meetings can be held in the community or neighborhood (for example, in a local school, temple or other familiar gathering place).

Meetings may be formal or informal. The agenda generally focuses on a single issue. Town hall meetings allow for direct and immediate response to questions and comments, and clarification of facts or ideas.

(Note that this description of town hall meetings is narrower than the definition provided by the King's Institute in Thailand; the latter definition also includes community-sponsored gatherings.)

Process

As an example, a town hall meeting is called to discuss the development of a neighborhood improvement plan. First, municipal staff gives a presentation on the issue, which provides a common informational basis for citizens in attendance. Municipal staff members answer questions posed by citizens and record public comments. Municipal leaders may also be present to hear comments and moderate the session.

Advantages

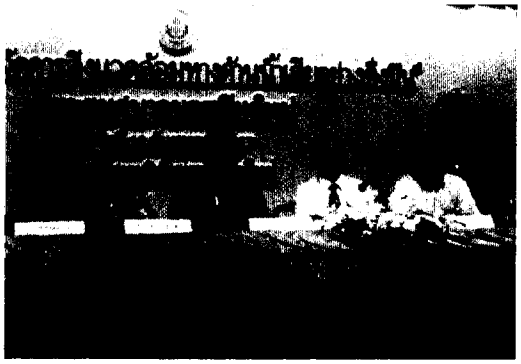
Because the town hall meeting is typically focused on a single issue, it is an effective technique to solicit, receive and discuss public comments on an issue.

Disadvantages/Challenges

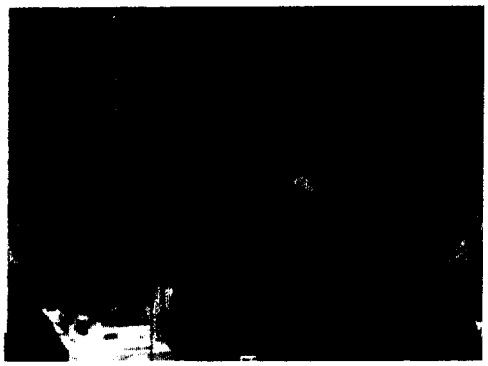
Town hall meetings can provide a public platform for vocal project opponents, who may use the opportunity to rally broader opposition.

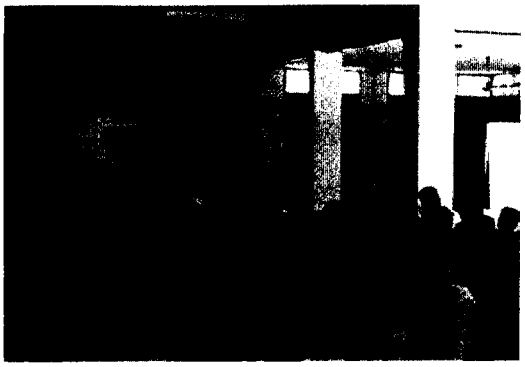
Town hall meetings can be intimidating to members of the public who are shy and reluctant to speak in front of an audience.

The logistics of setting up and conducting a meeting outside city hall may be viewed as a disadvantage of this technique. However, this can be positive: town hall meetings offer an opportunity for municipal staff and leadership to get out into the community, and this may help change the perception of some citizens that the municipality is out of touch with its citizenry. So, these types of meetings can be a visible demonstration of a municipality's commitment to citizen participation.

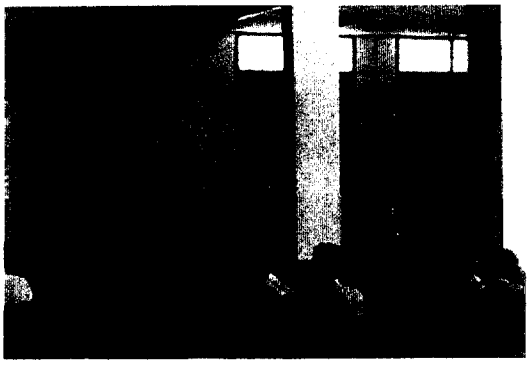


The City of Chiang Mai held a town hall meeting to discuss sustainable wastewater management issues on September 14, 2004 at the Empress Hotel in Chiang Mai. Approximately 150 participants attended, including community members, non-governmental organizations (NGOs), and government representatives. Municipal staff presented information about the current and projected wastewater situation, wastewater treatment and management expenses, and government policy. This meeting provided participants with an understanding and awareness of Chiang Mai's wastewater issues, and raised public interest in taking responsibility for wastewater management in the community.

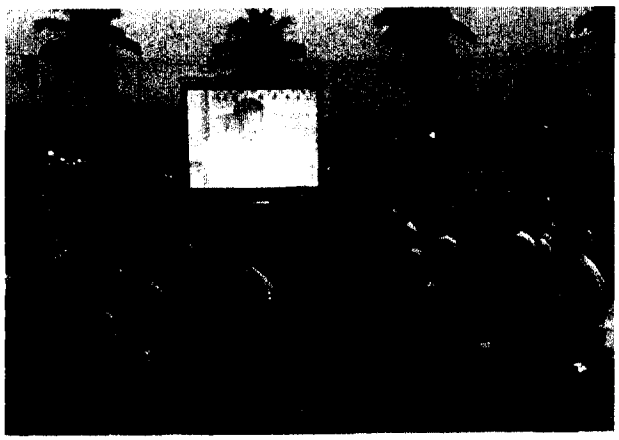




A town hall meeting was held to discuss development along the banks of the Ping River in Chiang Mai through the center of the city at Kanprean Hall, Ked Temple, on May 6, 2005. Participants included residents of communities along the riverbank, and representatives from private and government organizations and educational institutions. At the meeting, municipal staff presented the project's history and described problems along the riverbank, and presented some basic concepts for development. Following the presentation, participants were invited to offer comments and suggestions about the project.

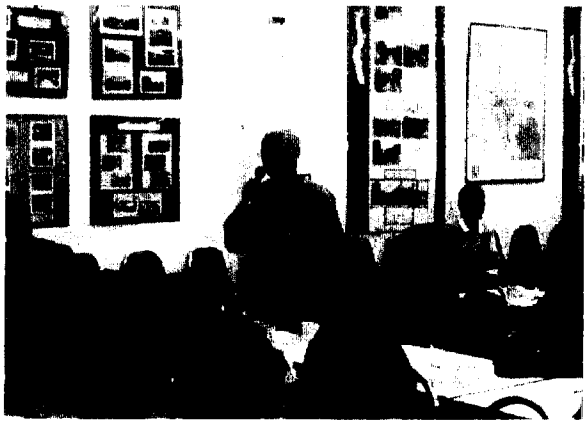


The Khon Kaen City Council held its third public meeting regarding wastewater management on December 20, 2004 at Khon Kaen Public Park. Approximately 300 participants attended, including members of the community, private and public organizations and other interested people. At the meeting there was agreement regarding the proposed collection fee - that it should be based on BOD load (BOD value times water usage quantity). The municipality will draft a regulation to collect wastewater fees from three user groups, classified by their water usage quantity and the BOD value. Housing, the largest user group in the community, will be phased into the program three years following the initial implementation of the collection fee.



The City of Phuket organized a town hall meeting to discuss landscape improvements for the Klong Bang Yai (Bang Yai Canal) on May 21, 2004 and November 17, 2004 at the Environmental Information Center in Phuket.

The project area is very large and would affect many people, so a series of town hall meetings were conducted for different stakeholder groups. Approximately 180 participants attended, including residents and business owners from the nearby Klong Bang Yai community, fishermen, representatives from industry and educational institutions, students, and others. At the meeting, staff resented the significant issues of Klong Bang Yai and development guidelines, and participants brainstormed ideas for improvements to the Klong Bang Yai. The municipal staff will incorporate ideas generated at the meeting and will prioritize the to guide the project into the future.



B. Advisory Committees and Task Forces

Definition and Purpose

An advisory committee or task force is a group of citizens appointed to provide continuing advice on issue(s) to city council, or to municipal staff.

A task force is a group of citizens appointed to work on a specific objective or problem. It exists only for the time necessary to complete the task. A task force may also be a sub-committee to a larger advisory group and is limited in size so that it can be an effective working body.

In both cases, the selection of members is critical. Membership must be broad enough to be representative of the affected community, yet not too large to be effective and manageable.

Process

Expectations of the role of the committee or task force must be clear to all parties. Putting these expectations in writing is an excellent way to guide the committee or task force in its assignment, as well as to terminate it when the job is complete.

Advantages

Advisory committees and ad hoc task forces are effective in focusing attention on an important issue for a short period of time. They are useful in organizing input from a wide range of people and developing consensus for action on many complex issues that touch upon many facets of the community.

Disadvantages/Challenges

Without a clear charter that defines the committee's role and responsibilities, there is a risk that members will want to expand the scope of their responsibilities beyond their assignment. To manage this situation, a written charter can outline clear expectations, guidelines, tasks and limits for the group.

Disagreement within the committee can also make the process difficult. The charter can provide guidance about how the committee will reach conclusions and how disagreements will be managed.

WHEN FORMING A COMMITTEE...

Be clear about roles and responsibilities

- Is the group expected to make a recommendation?
- Is the group expected to reach consensus?
- Is the group expected to offer feedback only, without making a formal recommendation?
- Are members expected to represent specific constituencies, or are they expected to offer their individual opinions?

Be clear about the duration of the committee

- Will it dissolve at the conclusion of the specific task?
- Will it have an ongoing role beyond the specific task?

C. Public Workshops

Definition and Purpose

Workshops are highly interactive. They offer an opportunity to develop a shared vision for the future and identify common concerns and priorities among citizens. Through group discussions and structured exercises, citizens can work alongside municipal staff to problem-solve and engage in creative brainstorming.

Process

There are a number of ways to design a workshop to serve a wide variety of purposes: developing a common vision; identifying and prioritizing concerns; brainstorming ideas and solutions; and many others. All workshops require a lot of preparation to design participatory exercises to match the intended purpose.

Advantages

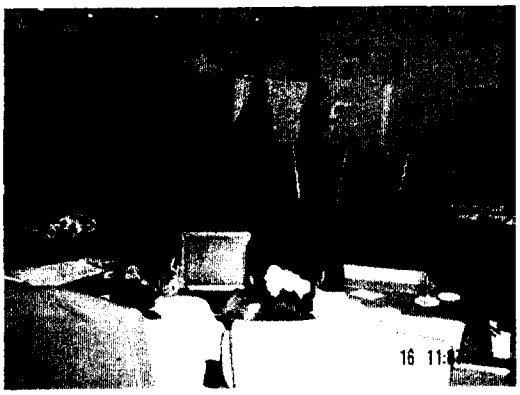
Workshops can be fun, inspiring and energetic. Because they are so highly interactive, they are far more engaging than conventional meeting formats.

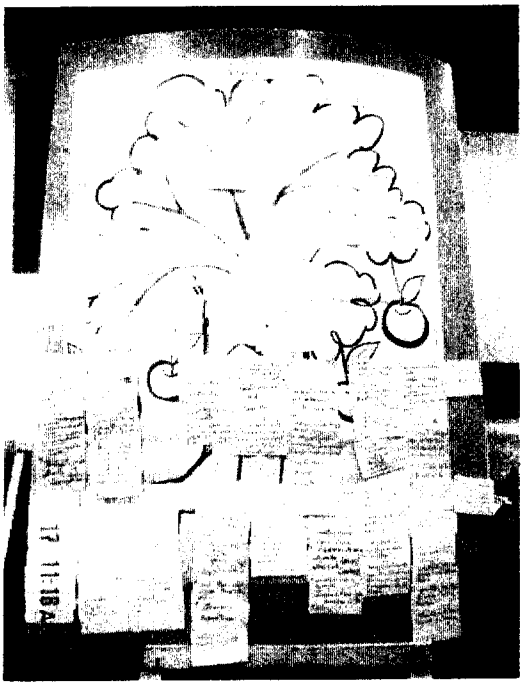
Small group discussions may help to broaden citizens' perspectives because of the mix of viewpoints represented at each table.

Disadvantages/Challenges

Workshops involve a significant amount of preparation to design the exercises and set up the room(s) to enable productive discussions.

Workshops also are very staff-intensive to conduct. Small group discussions require skilled facilitation to make sure that everyone is heard and respected, no one monopolizes the discussion, and to keep the discussion on track. Staff or a volunteer citizen should take notes on flip charts, in order to keep a record of the discussions. Follow-up after the workshop is important too: providing participants with a summary afterwards provides them with a useful record of the session and signifies that their comments will be considered through the next stages of the process.





The municipality of Phuket conducted a public workshop on March 16, 2005 regarding rebuilding after the December 26, 2004 tsunami. Participants from several community sectors were invited to offer comments and suggestions following a brainstorming model called the "Tree of Thought." In this model, participants brainstorm 1) what they observe (problems and Opportunities), represented by the roots of the tree; 2) what they hope for, represented by the trunk of the tree; 3) what they can personally contribute towards solving problems, represented by the leaves of the tree; and 4) what they can contribute in collaboration with others, represented by the fruit of the tree.

The City of Khon Kaen conducted a public workshop to gain public comment and feedback on their proposed development plan on June 27 to 29, 2005 at Nongkai Grand, Nongkai. Participants included Khon Kaen municipal and administrative representatives, state enterprise, city council, development organization representatives, technical experts, members of the community, and other interested people. Participants raised issues and analyzed and evaluated problems and causes, and commented on proposals to address and resolve these problems. Municipal staff will consider the full range of issues, challenges and requirements raised by meeting participants to further refining the development and implementation plan.

D. Open Houses

Definition and Purpose

Open houses provide an opportunity for the public to become familiar with a project in an informal and visual way. Through the use of displays (which can include maps, drawings, photographs, and/or three-dimensional models), the public can learn at their own pace. Staff can be scattered among the displays to offer explanations of the materials and answer questions.

Process

Open houses can be stand-alone events, or they can be combined with and complement other events. For example, a town hall meeting can include an open house in the lobby, so that as citizens arrive for the town hall meeting they can wander around the displays to become familiar with the project prior to participating in the meeting itself. Similarly, an open house can precede a public workshop.

Advantages

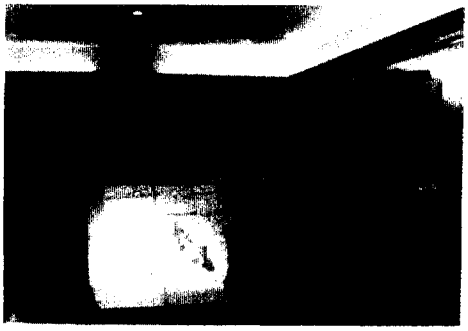
Displays of maps, photos, illustrations and/or three-dimensional models may be the most effective way to convey complex information about some projects. Open houses may also provide a comfortable opportunity for citizens to ask questions of staff one-on-one – an advantage for people who may be too shy to ask questions in a more formal public setting. The open house may also be designed to invite people to write comments on the featured proposals, either on the displays themselves or through other means (for example, a written questionnaire or in a comment log).

Open houses can be set up practically anywhere. While a meeting hall or city hall lobby is a typical location, open houses can also be set up in other public spaces (including shopping centers, schools, or temples). Displays can also be erected at a project site (for example, on a vacant lot that is the subject of a redevelopment proposal), as long as the displays are well constructed and weather-resistant.

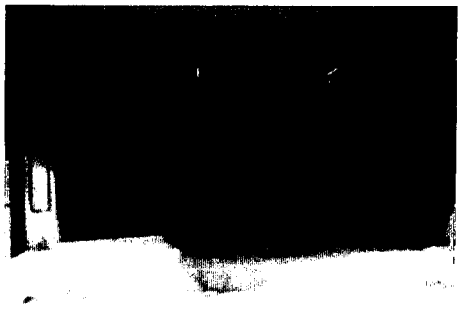
Disadvantages/Challenges

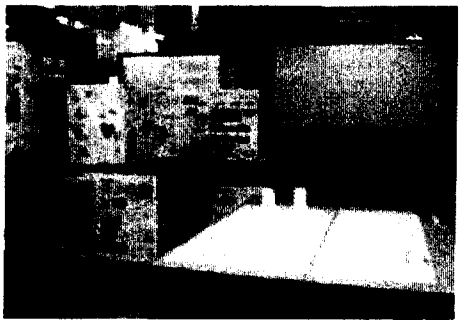
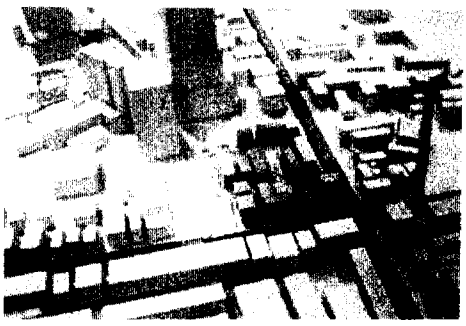
Open houses require a great deal of preparation to make sure the displays are visually interesting, legible, informative, and durable. Depending on the location, there may be an expense involved with purchasing or constructing display surfaces on which the visual materials can be mounted.

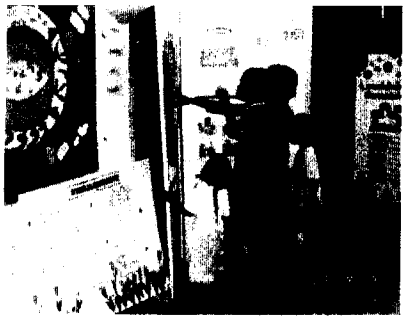
Ideally, an open house is adequately staffed to allow citizens to ask questions. However, a display can be designed to be self-contained without the need for staff in attendance. If this is the case, it is even more important that graphics are well designed to be clear and self-explanatory.

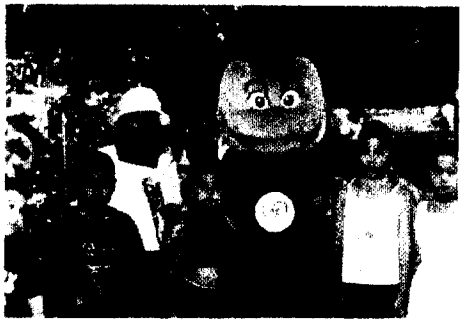



The City of Khon Kaen held an open house for the public to review and comment on a series of alternative designs for the restoration and improvement of the Rama Theater commercial district. Designs were prepared for the City of Khon Kaen by students in the architecture departments of Khon Kaen University and Mahasarakarm University. Students surveyed the district, interviewed community stakeholders, and conducted feasibility studies, and then presented their ideas in eight different concepts which focused on concentrated development through specific area improvements. The community was also invited to comment and offer suggestions at a second open house.

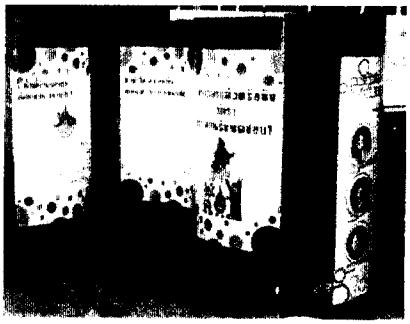


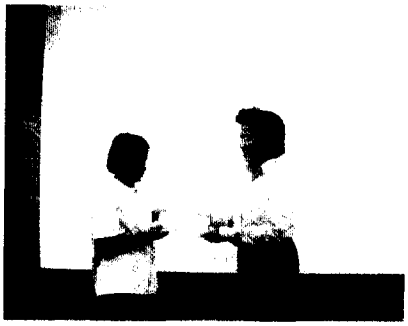


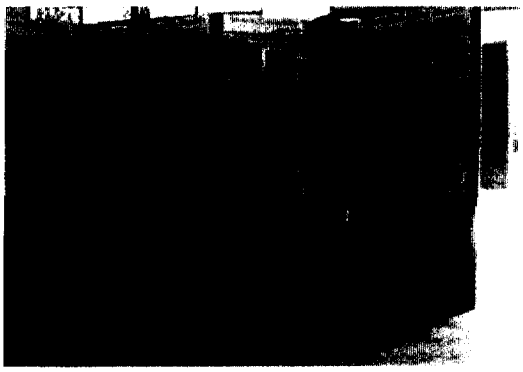



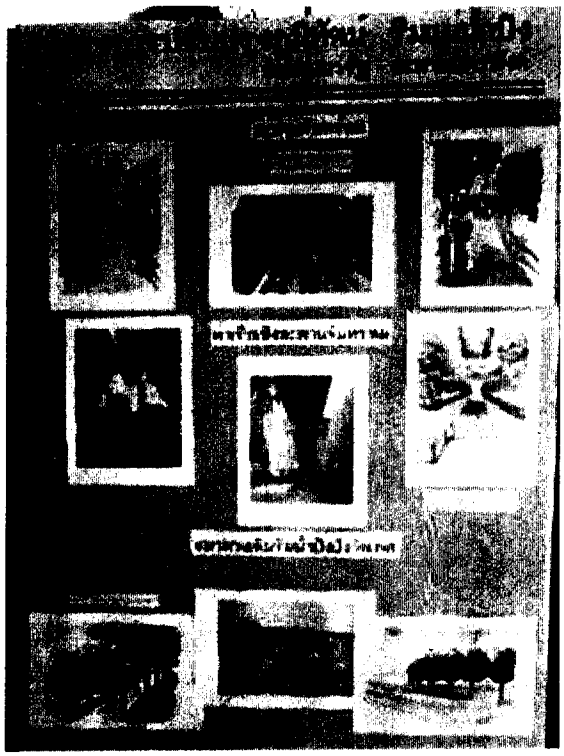
The City of Phuket conducted an open house to display environmentally sustainable development and water conservation programs and activities on August 29, 2004 at the meeting room of the municipal offices. Exhibits and activities were designed to promote water conservation and to elevate awareness of community wastewater treatment. An art competition for school children was held, with the themes "Saving the Water" and "Water is Life." Winners will receive a scholarship from the municipality.









The City of Chiang Mai held an open house to display proposed development concepts for redevelopment of the Ping River banks through the central city and to solicit public comments and suggestions. Development concepts were prepared in conjunction with Mae Jo University for several locations within the project area. Exhibits used several different display techniques, such as photo boards, poster-sized diagrams and landscape plans, and a three dimensional model.

E. Walking Tours

Definition and Purpose

Walking tours generally are a complement to other forms of public involvement, and provide citizens a chance to experience the physical setting of a project first-hand. Walking tours can introduce participants to issues that are best understood visually and directly. They are a good way to hear public comments on a project that will affect residents, merchants and property owners adjacent to the project.

Tours can promote a shared understanding of physical conditions, challenges and opportunities. They also allow residents and shopkeepers to be the "experts" and present their own experiences and information to staff and other citizens.

Process

Like open houses, walking tours can be stand-alone events or they can be combined with and complement other events. For example, a walking tour may be scheduled in advance of a town hall meeting or workshop, to provide greater familiarity to participants about the physical setting of a project.

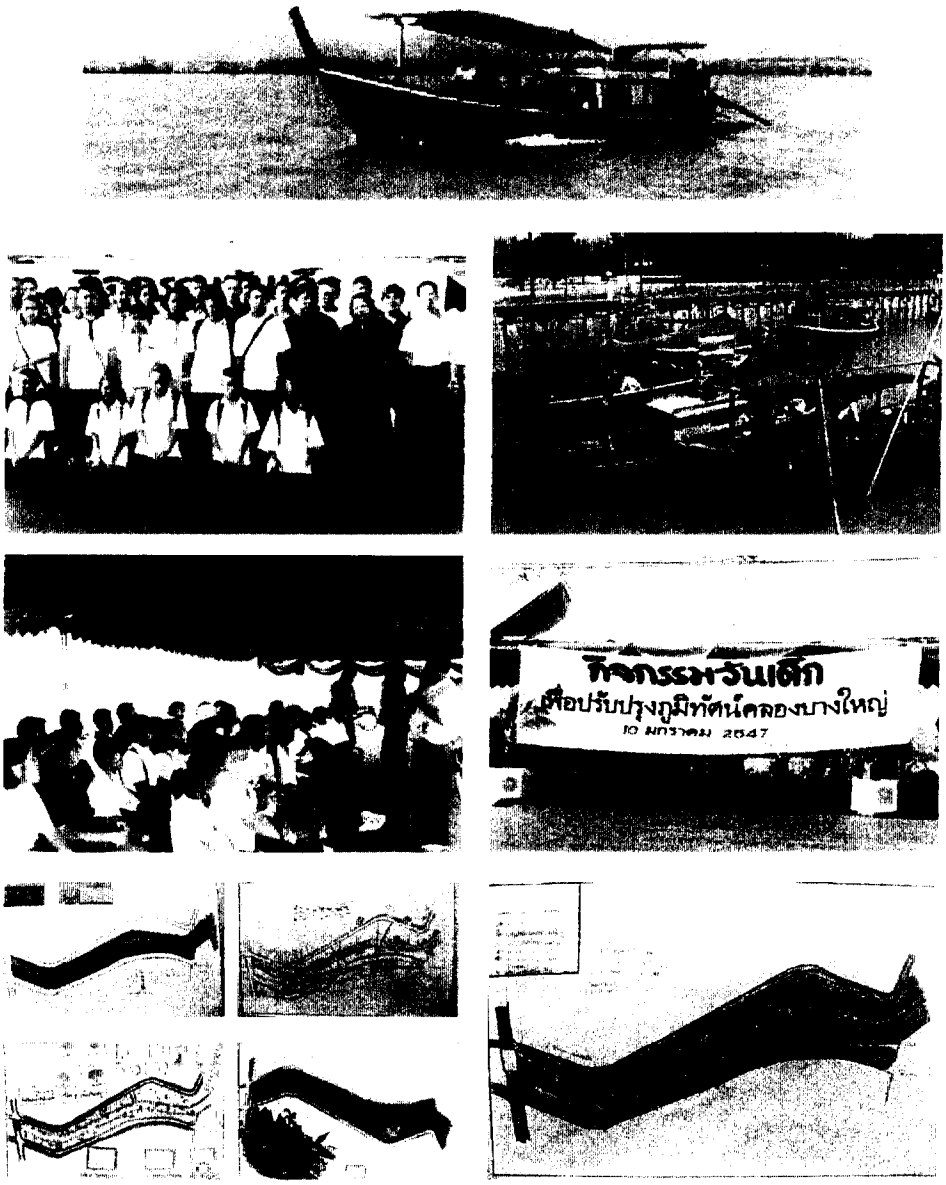
Walking tours can be conducted with a group, led by a guide. They can also be designed to be "self-guided" – that is, a citizen could go out on his or her own, guided by a printed itinerary, map and explanatory information.

Advantages

Walking tours enable citizens to understand the physical setting of a project in a way that cannot be conveyed through words alone. Information is enlivened by the physical experience of walking around. Residents and shopkeepers can provide tour participants with their perspectives and first-hand experiences that complement data and analysis provided by municipal staff.

Disadvantages

Guided walking tours should be relatively small to allow for people to stay with the group and be able to hear the commentary of the guide. Logistics may limit the number of people who can participate in any one tour. Daytime heat and other factors may also limit who will be able to participate, especially if the project study area is large and takes a long time to cover.



Phuket officials work with fishermen, school children and citizens on improvement plans for the Bang Yai Canal.

The Kaen Wetland is natural area in Khon Kaen with many activities such as bicycle trails, paddle boats, a dinosaur playground, the Hong Mu Mong city museum, a cultural center, and Nang-ning Park. Many people come to the Kaen Wetland everyday to enjoy these activities. A walking tour of the Kaen Wetland invited administration board representatives, municipal officials, community representatives and others on July 12, 2005 to explore the area and enjoy its beautiful views. In addition, participants were invited to become more familiar with the developed recreational areas and learn about water quality management, safety, site maintenance, and to evaluate the satisfaction of users. Participants were able to provide comments and suggestions directly to administrative and municipal officials and community representatives about development and restoration possibilities in their community

APPENDICES

A. Steps for Planning and Implementing a Citizen Participation Process

B. Keys to Successful Public Meetings

C. Use of the Media

D. Meeting Set-up

E. Checklist for Preparing and Conducting a Successful Town Hall Meeting

F. Dealing with Difficult Meeting Participants

G. Public Participation and Public Hearings in Thailand

Appendix A
Steps for Planning and Implementing a Citizen Participation Process

Planning

1. Identify the key issues
2. Define the objective; relate it to overall organizational goals
3. Determine whether there are other community issues that may affect your process (for example, something else going on in the same district that is controversial and that may be a distraction to citizens)
4. Seek organizational commitment from municipal officials for a participatory approach
5. Consult with others at city hall
   - Coordinate with other departments, agencies, and/or affected governments regarding their involvement
   - Determine whether a neutral facilitator is needed
   - Review schedules and availability of key persons
   - Determine program requirements (personnel and financial resources)
   - Determine information requirements
6. Identify key persons, departments or organizations that will be affected and build an understanding of issues and concerns
   - Develop a profile of the community
   - Identify key stakeholders
   - Clarify issues
   - Interview community leaders

Program Development

7. Draft a Citizen Participation Program
    - Summarize what is known regarding issues and options
    - Determine the decision-making process for the program
    - Determine objectives for each stage of citizen participation
    - Design citizen participation opportunities and identify appropriate participation techniques
    - Establish monitoring and evaluation efforts
8. Meet with key persons affected by the process or program
    - Confirm issues and options
    - Confirm objectives for each step of citizen participation
    - Confirm selection of facilitator, if applicable
9. Finalize program design
    - Finalize program requirements (personnel and financial resources)
    - Finalize information requirements
    - Finalize monitoring and evaluation efforts
    - Finalize schedules and work assignments
10. Consult with key persons and other public agencies on final design as applicable
    - Analyze results
    - Make changes as needed
    - Revise the draft
    - Determine additional decision-making processes as needed

Program Approval

11. Obtain a decision on final program design and schedule
    - Publicize the decision, along with the rationale
    - Emphasize accountability

Program Implementation

12. Involve participants in implementation and evaluation

Evaluation

13. Evaluate the program
    - Seek comment from key participants
    - Evaluate the results of the participation program; did it achieve the objectives?
    - Document the evaluation for use the next time a participation process is planned

Appendix B

Keys to Successful Public Meetings

- Select the type of meeting to best achieve your objectives
- Establish clear expectations for the meeting: explain the meeting's purpose and desired outcomes to the public at the start of the meeting, and provide a written agenda
- At the start of each meeting, summarize what has happened in the process so far and preview the next steps
- Conduct meetings in comfortable and conveniently-located places
- Arrange the meeting room to create the desired atmosphere (formal or informal) and to provide the optimal setting for the purpose of the meeting (presentation, discussion, or other)
- Practice before the actual meeting: test out your presentation to make sure the length fits the agenda; test technical equipment and make sure it runs smoothly; and test out sight lines to make sure the audience will have a clear view of the presenter and the screen, if applicable
- Establish "ground rules" for public participation so that the meeting is conducted in a respectful and orderly manner (for example, you can ask participants to hold their comments to three minutes each so that everyone has a chance to speak, or you can ask that everyone has an opportunity to speak once before anyone may speak a second time)
- Show the public that their comments are being heard (for example, record comments on flip charts)
- Make sure that shy people have an opportunity to voice their comments (for example, provide an opportunity to submit written comments)
- Use clear, simple and non-technical language
- Use engaging visual displays: many people are visual learners, and will absorb more information from graphic displays than oral presentations
- Minimize the potential for surprises: talk to key community leaders ahead of time to know where they stand on controversial issues; preview presentations that guest presenters have prepared, so you know in advance what they will be saying
- Prepare for unexpected outcomes (for example, what will you do if attendance greatly exceeds expectations? If meeting participants are unruly? If the technical equipment malfunctions and you are not able to give your PowerPoint presentation?)

At the conclusion of a public meeting, ask for feedback:

- How did you find out about the public meeting?
- Did you feel like your opinion mattered?
- Would you get involved in other civic projects?
- How could we do a better job involving citizens?

Feedback like this will help you refine and improve your citizen participation efforts for the future.

Appendix C:

Use of the Media

The mass media can help educate citizens about important public issues and decisions. Different types of media will play different roles and will convey very different messages about the same topic. The following list describes a hierarchy of media outlets and their ability to convey detailed background information for educating citizens on issues and their implications. They are listed in order of ability to provide detailed information.

- Internet sites: a good way to convey huge volumes of detailed data and related information on any topic. The information needs to be well organized and inter-related with "links" and "hyper text."
- Newspapers – Feature Articles: Prompting a reporter to prepare an article is difficult and you can't always rely on a reporter to be as complete as you would like. However, these can be a good way to educate the public on an issue that has enough "appeal" to entice a reporter to write an article.
- Public Access TV: Same as a feature article in a newspaper, but often limited in ability to get the full story included because of time limitations.
- Newspapers – News Stories: News articles typically only deal with the superficial aspects of an immediate decision and don't generally deal with the implications or impacts of a proposed action. News stories are good for identifying the basic questions, key issues, and notices of meetings or public steps. New stories can provide a strategic opportunity to tell the City's story first, before it becomes a community issue. This will help the community "frame" the issues in a positive way.
- Newsletters: These allow local government to tell its story in its own words, but because of limited space newsletters tend to skim the surface of an issue, very much like a news article (only from the perspective of the local government).
- Radio Interviews: These allow for communicating key issues in a format that enables a casual listener to "get the facts," but do not allow for more detailed study because once aired, the interview is not available for reference.
- OP-ED pieces: These provide a good way for a high profile official to raise key issues within the community.
- Letters to the Editor: These allow a well known individual to raise key issues, but typically these are not read by the general pubic.

- Radio News: Not good for conveying detailed information, other than to announce a meeting time and place.
- General Broadcast TV News: Only good for conveying key meetings and events. Typically these are made on the day of the meeting and therefore are only good for "reminding" people of a meeting.
- Banners, Billboards, PA Systems: Not good for communicating details and complexities. Good for communicating key messages or reminders about public meetings.

Appendix D

Meeting Set-up

The arrangement of a meeting room sets a tone for the public meeting and can contribute to a meeting's success. No matter what, a room should be comfortable, well-lit and inviting.

Level of Formality

Give some thought to how formal you want the meeting to be. A formal room arrangement may include chairs all facing the front of the room, with citizens and public officials sitting separately. This is a highly formal arrangement and suggests to the audience that they are there to listen and observe, but not necessarily provide input.

A meeting intended to be informal may include a seating arrangement in which everyone is intermixed and positioned to invite conversation – perhaps with chairs arranged around small tables or in a horseshoe pattern. In an informal meeting, the moderator or facilitator would be at the same level as the audience rather than on a stage. These arrangements suggest that citizens are encouraged to participate more actively in the meeting.

Visibility for Presentations

If the meeting includes a presentation, make sure that everyone has clear sight lines to the podium and/or screen. Even if the room is arranged for interaction (for example, with participants seated around tables), people can adjust their chairs to be able to view a presentation at the front of the room.

Lighting

Can the room be adequately darkened for a PowerPoint or video presentation? Is lighting adequate for the audience to see displays and/or speaker(s)?

Acoustics

Workshops, in which the participants break into small discussion groups, can be very noisy. Ideally, the acoustics of the room will allow for several simultaneous discussions without distraction. If not, you may want to plan for the discussions to occur in other spaces (for example, in rooms adjacent to the primary meeting space). Then, when the small discussions conclude, participants can reconvene in the larger meeting space.

Displays

You may choose to arrange displays around the perimeter of the room, so they can be viewed while the public meeting is in session. This arrangement can be beneficial, if the displays provide a useful backdrop to the meeting itself. However, this arrangement may be distracting, so think about whether it is preferable to have the displays set up in a separate space (either an adjacent room, or in the area leading into the meeting room). This way citizens can view the displays before and after the meeting, and/or during a break, without upsetting the flow of the meeting itself.

Refreshments

Meeting participants always appreciate refreshments at public meetings. The room arrangement must consider how people will flow from the entrance to the refreshment table to their seats. Is there enough room for a queue to form at the refreshment table, without blocking access to the seats? Can people comfortably move through the room if they want to get up for some more water or coffee during the meeting?

Appendix E

Checklist for Preparing and Conducting a Successful Town Hall Meeting

Pre-Meeting Planning

___Has a meeting space been located and reserved?

___Have arrangements been made for keys, seating set-up and clean-up?

___Does the meeting space have adequate lighting? Can the room be darkened for a slide presentation if necessary?

___Are audio visual equipment, microphone and extension cords available at the meeting space? If not, who will provide?

___Are participant handouts prepared: agenda, information sheets, feedback forms?

___Is a sign-in or registration form prepared? Are there adequate pens and paper?

___Are name tags needed?

___Are signs posted to direct participants to the correct building/meeting room?

___Are refreshments being provided?

___Are flip charts, easels, markers and paper available in the meeting room?

___Have facilitators, note takers and presenters been assigned?

___Do other local officials who plan to attend know their roles?

___Make sure flip charts and other audio visual aids can be seen by the participants in the room.

___Keep presentation as short as possible (15 minutes maximum is a good rule of thumb).

___Provide maps, clear instructions and signs to break-out rooms for small group discussions, if needed.

Meeting Notification

___Have key community members, municipal officials, and municipal staff been contacted regarding the meeting?

___Have the news media been contacted?

At the Meeting

___Is the room arranged to enable discussion between participants, if that is the purpose of the meeting?

___Introduce presenters and clarify the role of the meeting facilitator, if used.

___Review the agenda and rules of the meeting.

___Ensure that meeting participants understand and accept the objective of the meeting.

___Start on time and finish on time. Advise participants at the beginning of the meeting how long the meeting will last and expected time to adjourn.

___Encourage participants to complete and turn in meeting evaluation forms.

___Make sure that participants leave the meeting knowing what has been accomplished and what will happen next.

After the Meeting

___Transcribe flip charts and meeting notes.

___Add names from registration to mailing list.

___Make copies of notes or summaries of the meeting available as soon as possible.

Appendix F

Dealing with Difficult Meeting Participants

Public meetings can be stressful to manage – particularly when you encounter people who are confrontational and disruptive.

Here are some strategies for dealing with three types of difficult people: the "attacker," the "interrupter," and the distracter."

The "Attacker"

Sometimes people will challenge you as the presenter and make you part of the problem. This behavior is intended to either push you towards their view of the right course, or eliminate the obstacle you represent. There can be no subtleties with an attacker. As a presenter, you may perceive this behavior as a personal attack, but to the attacker, the behavior is just a means to an end.

Your goal: command respect.

Suggested strategies:

- Hold your ground – Stay put. Do not change your position, whether you happen to be standing, sitting, leaning, or making up your mind. Silently look the attacker in the eyes, and shift your attention to your breathing.
- Interrupt the attack – The best way to interrupt anyone, whether they are yelling or not, is to evenly say their name over and over until you have their attention.
- Quickly rephrase the attack into something you can agree with, such as: "I know you're frustrated by ....."
- Target your position and focus on future cooperation – Your position should be no more than two sentences, such as: "I hear you're having a problem with the way this is being done. But I am not willing to discuss it if this is how you are going to talk to me. When you are ready to speak to me with respect, I will take all of the time you want to discuss it."

The "Interrupter"

Sometimes people will make comments from the back or middle of the room without asking for permission to speak. This interrupts the meeting and the flow of information.

Your goal: bring the interrupter out of hiding.

Suggested Strategies:

- Stop, Look, Repeat – Because of something that is said or the way something is said, it seems to you that someone is taking a shot at you, STOP – even in the middle of a sentence or word. Interrupt yourself. Now LOOK at the interrupter. Stare that person in the eyes. Then REPEAT the comment, such as: "So, I heard you say that....."
- Now, use a probing question (for example, "When you say that, what are you really saying?" or "What does that have to do with this?"). Your purpose is to probe for what's bothering the person.
- If the interrupter becomes an attacker, use the attacker techniques described above.

The "Distracter"

Many times in public meetings, a citizen will make a comment or suggest an idea that has general merit but is not on topic and would divert the group from what is being discussed. A good technique for dealing with this situation is to record these comments on a flip chart (referred to as a "parking lot") for future consideration.. With this technique you can acknowledge the comment or idea, but still keep the group focused on its task.

Your goal: acknowledge the comment and reserve it for future consideration.

Suggested strategies:

- "That's a good idea, but it's not quite focused on our topic. Let's record it so we won't forget it."
- Record the comment on the designated sheet for a "parking lot" of good ideas, and then return to the discussion.

Appendix G

Public Participation and Public Hearings in Thailand

The 1997 Constitution of the Kingdom of Thailand (B.E. 2540) is regarded as "the Constitution for the People" because, unlike earlier constitutions, it provides for public participation through a number of provisions that address:

- access to information
- expressing opinions
- the initiative process
- voting
- participation in civic life
- the right of oversight through petitions, legal proceedings and recall

Section 59 of the new Constitution provides citizens with the opportunity to give testimony in public hearings. At this time (July 2005), legislation has not yet been enacted to support these provisions. However, the Public Hearing Act has been drafted and is currently under consideration by the Office of the Council of State. Pending enactment of this new legislation, public hearings are conducted under three existing Thai laws: the Industrial Product Standards Act, the Agricultural Land Reform Act, and the City Planning Act.

The Thai version of this manual includes an article entitled "Proposal for Public Hearing Procedure for the People of Thailand (Part 1)," written by Dr. Nattawat Braramanundha, Faculty of Law, Chulalongkorn University. The article was originally published in www.pub-law.net/article/ on July 13, B.E. 2548 (2005).

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EVALUATION OF THE US-ASIA ENVIRONMENTAL PARTNERSHIP

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June 7, 2002

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EXECUTIVE SUMMARY

THE GOAL AND OBJECTIVES OF THE PARTNERSHIP

The US-AEP was formed in January 1992 under an Executive Order signed by President George H. Bush. The intent of the Order was to "harness U.S. expertise" and address the serious environmental problems that are emerging in a number of Asian countries due to sustained population increases, extensive urbanization, and rapid economic growth.

In its early years, the US-AEP focused on establishing a recognized presence in Asia. It developed a wide network of partners and moved aggressively to implement an action plan. In 1997, the notion of promoting "a clean revolution in Asia" surfaced and under the rubric of an US-AEP Results Framework, became the program's overall goal. Strategically, this led to efforts to forestall further deterioration of environmental conditions in Asia at all levels of engagement and to work to bring industrialization, urbanization and environmental protection programs into alignment so that sustainable growth in the Asian economies could be achieved.

In terms of program-level activities, this meant focusing program resources on the achievement of four objectives: improved public policy and environmental regulations; improved urban environmental management; improved industrial environmental performance; and the increased transfer of U.S. environmental technology, expertise, and practices to Asian countries to effect needed environmental improvements.

PURPOSE OF THE EVALUATION

USAID is currently undergoing a process of reorganization, which has included sector portfolio reviews that are being chaired by the Deputy Administrator. The purpose of the reviews is to determine whether activities should be phased out or continued and, if continued, where in the Agency they will be managed. This evaluation is meant to help inform Agency decision making by assessing one of the ANE Bureau's largest environmental programs and by answering questions as to which US-AEP activities are of highest priority to USAID and should be continued, and which should be transferred to other agencies, modified or terminated.

OVERALL ACCOMPLISHMENTS OF THE US-AEP

Since being formed in 1992, the US-AEP has successfully:

- helped to broaden awareness of the need to address Asia's environmental problems
- pointed up the need for assistance efforts to be targeted and focused on specific environmental problem areas if they are to be effective
- established a network of partners in both Asia and the U.S. equipped with the knowledge, resources, leadership capacity, and tools to work effectively towards solving Asia's environmental problems

- established the kind of flexible program management structure that is needed to ensure the effective implementation and coordination of environmental improvement efforts at the regional and country levels
- contributed significantly to U.S. sales of U.S. environmental technologies; through US-AEP over 700 Asian firms were successfully matched with U.S. exporters

US-AEP has formed 195 U.S.-Asia partnerships since the program began. Through its partnership with the Council of State Governments (CSG), 36 projects have been undertaken involving 23 states and 110 state agencies.

Through its partnership with the National Association of State Development Agencies (NASDA), US-AEP has provided small matching grants to small and medium-sized U.S. firms (SME's) to market their environmental goods and services in ways that build capacity in Asia. The program made grants that generated over $350 million in export revenues.

The Environmental Exchange Program (EEP) funded by the US-AEP and administered by the Institute for International Education (IIE) has facilitated meetings, tours, and information exchanges for some 4,223 Asian and American decision makers

US-AEP REGIONAL AND FIELD-LEVEL ACCOMPLISHMENTS

The establishment of a Regional Environmental Center for Livestock Waste Management in Taiwan

US-AEP led and organized a partnership of American equipment manufacturers and a consortium of five U.S. universities to design in concert with Asian participants, an innovative livestock waste treatment system that uses the latest American equipment and technology. The consortium has just completed technical performance testing of the innovative system, and has predicted that it will change the landscape of livestock management not only in the U.S. and Asia, but worldwide, in the next decade

The Water Efficiency Team (WET) project in Indonesia

Initiated by US-AEP in FY 1999, the project is designed to help fragile municipal water distribution enterprises achieve financial sustainability. It attracted USAID Mission follow-on funding and to date, the project has enabled more than 370,000 community residents to receive piped water.

Improving air quality in Thailand

For the past three years, the Maryland Department of the Environment has been working in partnership with the Thai Government's Pollution Control Department, USEPA, US-AEP, and the Thai government's Entrain program to design a model for air quality planning that would enable local officials in Chiang Mai to identify areas that were sources of air pollution. This would, in turn, enable community residents to take action to reduce the pollution. As a result of the success of the model, Thailand is gradually shifting responsibility for air quality management from federal control, to its provinces and municipalities.

Technology export opportunities

US-AEP is continuing to alert U.S. firms regarding technology export opportunities related to implementation of the ADB-funded $175 million Pasig River Rehabilitation Project.

Passage of a Clean Air Act in the Philippines

Passage of the Clean Air Act in 1999 is pressuring industry and government to take steps to decrease emissions and to increase monitoring. Under the umbrella of the Clean Air Act and the ADB-funded Metro Manila Air Quality Improvement project, US-AEP and USEPA spearheaded a public outreach campaign on the phase out of leaded gasoline and are helping to promote public acceptance of the Act

THE EXTENT TO WHICH THE US-AEP "PARTNERSHIP APPROACH" HAS BEEN EFFECTIVE IN ACHIEVING RESULTS AND IN ADVANCING USAID DEVELOPMENT GOALS IN THE ANE REGION

US-AEP began in 1992 with a vision to approach development assistance in two new ways. One was to tie development to U.S. exports, in order to incorporate environmentally beneficial technologies from the U.S. into Asia's burgeoning stock. The second was to create partnerships that would continue to promote sustainable development, beyond the reach and longevity of development assistance programs, and thereby draw upon the resources and experience of public and private organizations that would not otherwise be engaged in the development assistance process.

The overall accomplishments cited in Sections II.A and II.B of the Main Report attest to the extent to which the US-AEP "partnership approach" has been effective in achieving these results. The approach has been particularly effective in facilitating interaction between public and private entities; in making arrangements for broad-based participation in conferences and workshops; and in expediting the replication across country lines of successful and replicable activities, such as the Regulatory Dialogue and country efforts to phase out leaded gasoline.

THE EFFECT OF THE DECISION BY THE DEPARTMENT OF COMMERCE TO TERMINATE ITS PARTICIPATION IN US-AEP ACTIVITIES

Almost from its inception, US-AEP and the Department of Commerce (DOC) have jointly funded the Technology Representatives (Tech Reps) stationed in Asian countries. Accordingly, the effect of the decision by the DOC to terminate its participation in US-AEP activities as of September, 2002, has been to disrupt what was shaping up to be the timely emergence of the kind of institution that will be critically needed over the next several decades to address the serious environmental problems currently emerging in a number of Asian countries.

CONCLUSIONS

The US-AEP, through its "partnership approach", has been successful in mobilizing U.S. expertise and using it effectively to address the "serious environmental problems in Asia". It has, accordingly, achieved its initial goal.

The current US-AEP strategy of directing program resources to activities whose objectives are bringing about better public policy and environmental regulation; improved urban environmental management; improved industrial environmental performance; increased transfers of environmental technology, expertise and practices through trade and investment; greater involvement of civil society in environmental matters; and improvement in energy efficiency, seems well suited to both the environmental needs of the countries in which it is operating and to its own capabilities.

The Team considers the US-AEP to have been cost effective in its operations to date, and a model for USAID advancement/achievement of its environmental goal. This judgement reflects:the US-AEP's relatively low program cost of $15 to $17million per annum.

The "clean revolution", which has emerged recently as the US-AEP's current goal, needs to be seen as a revolution – one directed at bringing equivalency to environmental concerns and putting them on a par with economic growth and social benefits requirements in the allocation of USAID development assistance resources.

RECOMMENDATIONS AS TO FUTURE US-AEP OPERATIONS

The Evaluation Team recommends that the US-AEP program remain within the management structure of the ANE Regional Bureau for the foreseeable future. Team interviews confirmed that regional identity, and responsiveness to differences across regions have been important to the program's success. In so doing, the ANE Bureau should modify the program's organizational structure and mode of operation, as needed to convert it into a field-driven operation.

Specifically, the Team recommends that the ANE Bureau establish one or more regional US-AEP offices in Asia to provide direct supervision of contract and local staff and to continue to improve coordination with the environmental improvement programs being implemented by USAID Missions and the ADB, and by other national and international organizations operating in the region.

The Team recommends that the ETNA trade leads activity be transferred to the EGAT Bureau and merged with other such initiatives. Also, that the US-AEP continue its efforts to engage the five ADCs in environmental improvement activities in the LDCs. The ANE Bureau should ensure that the US-AEP program continues to be given the high-level of support by USAID that is required, if it is to achieve its current environmental goals and objectives.

The Evaluation Team believes that it is essential to the continued success of the US-AEP program that EPA technical staff become more active in providing information and advice to US-AEP and beneficiary countries, particularly regarding appropriate environmental technologies, and that it be more forthcoming in providing technical support services. The MOU between the US-AEP and the EPA should be updated accordingly. The Team heard a number of complimentary remarks, during its field interviews, regarding the quality of the technical services provided by EPA field staff; however, these remarks were coupled with comments to the effect that EPA field operations were not very well funded, limiting their availability.

The US-AEP Executive Director should strive to keep a narrow focus on the scope of program activities. As suggested earlier, bringing about the greater involvement of civil society in

environmental matters should be dealt with as an integral component in the five other areas of program focus, and should not be identified and managed separately. During its field visits, the Evaluation Team noted that there is considerable scope in client countries for the near-term expansion of US-AEP activities relating to the bringing about of better public policy and environmental regulations; and to the improvement of urban environmental management in Asia's rapidly expanding urban centers. In this regard, there appears to be considerable concern among Asia's urban planners that the environmental problems of the high levels of water and air pollution emanating from small and medium-scale industries in urban areas are not being adequately addressed by organizations such as the US-AEP. Steps should be taken to ensure that these problems are addressed.

LIST OF ACRONYMS

A&WMA	Air and Waste Management Association
ACEC	American Consulting Engineers Council
ADC	Advanced Developing Country
ADB	Asian Development Bank
AIT	American Institute in Taiwan
ANE	Asia and Near East Bureau (USAID)
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of South-East Asian Nations
CSG	Council of State Governments
CTEM	Clean Technology and Environmental Management Program
EGAT	Economic Growth, Agriculture, and Trade
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
EPIQ	Environmental Policy Indefinite Quantity Contract
ETNA	Environmental Technology Network for Asia
EU	European Union
FCS	U.S. Foreign and Commercial Service
GDA	Globval Development Alliance
GIN	Greening of Industry Network
GTN	Global Technology Network
ICLEI	International Council for Local Environment Initiatives
ICMA	International City/County Managers Association
IIE	Institute for International Education
IIEC	International Institute for Energy Conservation
IPCC	Intergovernmental Panel on Climate Change
IQC	Indefinite Quantity Contract (USAID)
IR	Intermediate Result (USAID)
IRG	International Resources Group
ISO	International Organization for Standardization
ITRI	Industrial Technology Research Institute
LAC	Latin America and Caribbean Bureau (USAID)
LDC	Lesser Developed Country
LGU	Local Government Unit (Philippines)
MOU	Memorandum of Understanding

NASDA	National Association of State Development Agencies
NGO	Non-Governmental Organization
NPPR	National Pollution Prevention Roundtable
OECD	Organization for Economic Cooperation and Development
OPIC	Overseas Private Investment Corporation
OPF	Overseas Program Fund (NASDA)
PADCO	Planning and Development Collaborative
PAG	Program Advisory Group (US-AEP)
PROPER	Program for Performance Rating
PSC	Personal Services Contractor
PVO	Private Voluntary Organization
RHUDO	Regional Housing and Urban Development Office (USAID)
SCO	Senior Commercial Officer
SME	Small and Medium Enterprise
TDA	U.S. Trade Development Agency
TPCC	U.S. Trade Promotion Coordinating Council
TSSC	Technical Support Services Contract
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
US&FCS	U.S. Foreign and Commercial Service (U.S. Dept. of Commerce)
USAID	United States Agency for International Development
US-AEP	United States-Asia Environmental Partnership
USDOC	United States Department of Commerce
USG	United States Government
WEC	World Environment Center
WEF	Water Environment Federation
WRI	World Resources Institute
WTO	World Trade Organization

EVALUATION OF THE US-ASIA ENVIRONMENTAL PARTNERSHIP

FINAL REPORT -- MONDAY, JUNE 11TH, 2002

I. INTRODUCTION

A. THE GOAL AND OBJECTIVES OF THE U.S.-ASIA ENVIRONMENTAL PARTNERSHIP (US-AEP)

The US-AEP was formed in January 1992, under an Executive Order signed by President George H. Bush. The intent of the Executive Order was "to harness U.S. expertise to address the serious environmental problems in Asia". The action plan that was to be developed, pursuant to the Executive Order, was to address the four environmental problems that presented the greatest immediate threats to the region. These included water quality and wastewater management; solid and toxic waste management; air pollution from industry, transportation and energy production; and deforestation and loss of bio-diversity. The Executive Order noted that the effect of this undertaking would be to enhance export and other commercial opportunities in Asia for U.S. businesses.

The action plan was to encompass four types of activities. USG loan guarantees were to be issued and funds for feasibility studies provided to private sector firms for the development of environmental infrastructure, including the production of lead-free fuels. Environmental business centers were to be established in selected Asian countries that would feature trade exhibits on U.S. environmental equipment and services. Fellowships were to be provided for two-way exchanges of scholars and senior level managers, to identify solutions to pressing pollution and conservation problems in Asia. A regional network was to be established to help conserve Asia's biological diversity and its unique forest and marine resources.

In its early years, the US-AEP focused on establishing a recognized presence in Asia. It developed a wide network of partners who shared its objectives, and moved aggressively to develop an action plan that addressed the broad range of technical and management issues related to the four environmental problem areas noted above. In so doing, it used a variety of tools and approaches that included conferences, workshops and training seminars, technical and managerial exchanges, and small grant programs. US-AEP worked to establish close ties with the U.S. Department of Commerce (DOC) and with the U.S. Environmental Protection Agency (EPA), in order to advance the development of trade ties and environmental leadership interests between the United States and Asian countries.

Gradually, the thrust of the program was shifted from promoting trade and the sale of U.S. environmental technologies, services and equipment, to implementing discrete activities aimed at putting the region on an "environmentally sustainable pathway of long-term economic growth". In 1995, the program began to focus increasingly on pollution prevention and on promoting the use of energy-efficient products, processes, and services. It launched the Clean Technology and Environmental Management (CTEM) Program to engage Asian industries in the adoption of pollution prevention principles. Greater emphasis was given to the development of an overall policy framework for environmental improvements, and on implementing environmental policies at the

national and provincial levels. Bio-diversity was dropped from its action agenda, as were activities in the energy sector.

In 1997, the notion of promoting "a clean revolution in Asia" surfaced and, under the rubric of the US-AEP Results Framework (Exhibit 1), became the program's overall goal. Strategically, this meant that the US-AEP needed to bolster its efforts to forestall further deterioration of environmental conditions in Asia, at all levels of engagement, and work to bring industrialization, urbanization and environmental protection programs into alignment, so that sustainable growth in the Asian economies could be achieved. In terms of program-level activities, this meant focusing program resources on the achievement of four main objectives: improved public policy and environmental regulations; improved urban environmental management; improved industrial environmental performance; and the increased transfer of U.S. environmental technology, expertise, and practices to Asian countries to effect needed improvements.

Achieving these objectives also required that emphasis be given to maintaining sustained contact with the key people, institutions, and forces that constituted the drivers behind efforts to bring about the clean revolution, including in particular the leaders and residents of the communities involved. It also meant taking action to increase the capacity of Asian governments to develop sound public policies and regulatory regimes, identify options that might be pursued to solve on-site urban and industrial environmental problems; and expedite the investments and technology transfers needed to reduce urban and industrial pollution.

B. PURPOSES OF THE EVALUATION

USAID is currently undergoing a process of reorganization, which has included sector portfolio reviews that are being chaired by the Deputy Administrator. The purpose of the reviews is to determine whether activities should be phased out or continued and, if continued, where in the Agency they will be managed. This evaluation is meant to help inform Agency decision making, by assessing one of the ANE Bureau's largest environmental programs and by answering questions as to which US-AEP activities are of highest priority to USAID and should be continued, and which should be transferred to other agencies, modified or terminated.

The US-AEP program has been subjected to several evaluative reviews and assessments over the past ten years. It underwent a comprehensive mid-term assessment in February 1995. In response to direction from the ANE Bureau, the Secretariat also organized an external review of the program that was undertaken in 1997. In addition, a management assessment of how the US-AEP operates was undertaken in September 1998, through a contract issued by USAID Office of Procurement, at the request of the Executive Director at that time. A series of reports on nine major evaluations of individual components of the US-AEP that had been conducted during the previous year, as well as a summary report of the nine evaluations, were published in June 1999. The present evaluation is focused on assessing program accomplishments since the mid-term evaluation, and covers the period from 1995 to the present.

Several of the findings contained in the Final Report of the 1995 mid-term evaluation, form a useful context to the present evaluation and bear repeating. It was noted, for example, in the Executive Summary of the mid-term evaluation, that the "US-AEP is distinct from traditional USAID programs in that it did not identify site-specific objectives against which resources could be programmed.

Instead, US-AEP concentrated on brokering linkages between U.S. businesses, government agencies, and non-governmental organizations to support the transfer of U.S. environmental technology and management skills to Asia".

It was also noted in the report that, "although US-AEP serves multiple clients – including USAID bilateral missions, Asian governments, and the U.S. private sector – the program has often been perceived as being primarily a technology transfer program, albeit one that operates within the environmental sector. This is not surprising, given that a majority of US-AEP program implementers have as their primary constituents the U.S. private sector, and that the program's most prominent presence in Asia is through the Technology Representatives, whose mandate is to support U.S. to Asia environmental technology transfer .".

Two of the main conclusions drawn by the mid-term evaluation team also bear repeating. For one, the team concluded that the "US-AEP is sufficiently novel within USAID so as to be incongruent with key elements of USAID procedure". US-AEP, by not having programmed site-specific environmental objectives, has caused some tension between it and the ANE Bureau, and has left the program vulnerable to perceptions that it lacks "a sufficiently focused strategy". Secondly, the team also noted as a second conclusion that, "there is a widespread view, shared by the (mid-term) evaluation team, that US-AEP's image and impact would benefit from additional clarity in its goals, objectives and strategy. While almost certainly requiring some narrowing of the program's scope, effort should be made to do so in ways that do not unduly limit the program's current operational flexibility and entrepreneurial character".

It is clear from the present Development Associates (DA) evaluation team's assessment of US-AEP performance that, the several shortcomings noted in the mid-term evaluation have been rectified. There is still a lingering misperception, however, that the US-AEP program is concentrated on "brokering linkages between U.S. businesses, government agencies, and non-governmental organizations to support the transfer of U.S. environmental technology and management skills to Asia".

II. ACCOMPLISHMENTS OF THE US-AEP

A. OVERALL ACCOMPLISHMENTS

Since being formed in 1992, the US-AEP has been successful in a variety of ways in mobilizing U.S. expertise and in focusing the program on addressing the serious environmental problems in Asia.

1. The US-AEP has helped to broaden awareness of the need to address Asia's environmental problems

US-AEP has contributed to the expanded awareness of Asia's environmental problems through the use of exchanges of information, workshops, seminars, and conferences. These activities have been aimed primarily at government decision-makers. They have helped to publicize the need for governments to create an enabling environment for environmental improvement at the regional, national and local levels. Since 1997, this has been a key focus of US-AEP activities.

2. ***It has pointed up the need for assistance efforts to be targeted and focused on specific environmental problem areas - if such efforts are to be effective***

Currently, US-AEP assistance activities are focused on bringing about better public policy and environmental regulation; improved urban environmental management; improved industrial environmental performance; increased transfers of environmental technology, expertise and practices, through trade and investment; greater involvement of civil society in environmental matters; and improvements in energy efficiency.

3. ***It has established a network of partners, in both Asia and the U.S., equipped with the knowledge, resources, leadership capacity, and tools needed to work effectively towards solving Asia's environmental problems***

Almost from its inception, US-AEP has had Technology Representatives (Tech Reps), funded in conjunction with the U.S. Department of Commerce, as well as Urban Infrastructure Representatives stationed in Asian countries; it has maintained a small technical support/field headquarters office in Manila. In 1996, US-AEP signed an Inter-Agency agreement with the U.S. Environmental Protection Agency to provide technical support and leadership in the areas of policy development, regulatory support, industrial compliance and technical assistance, urban pollution reduction, and urban infrastructure. Other important partners in the US-AEP network include the Council of State Governments (CSG), and the National Association of State Development Agencies (NASDA). In recent years, US-AEP has also been successful in establishing close and mutually beneficial partnerships with the environmental offices of the Asian Development Bank in Manila and with the Environmental and Social Development Unit of the World Bank in Bangkok.

4. ***The US-AEP has employed a broad array of motivational tools to generate and sustain partner interest and participation in Asian environmental improvement activities, to ensure that resources are targeted on designated problem areas, and to promote synergism among program participants***

US-AEP has formed 195 U.S.-Asia partnerships since the program began. Over 4,300 institutions in the U.S. and Asia have participated in US-AEP exchange and study tour programs. Through its partnership with the Council of State Governments (CSG), 36 projects have been undertaken involving 23 states, 110 state agencies, 35 academic institutions, and several dozen NGOs.

Through its partnership with the National Association of State Development Agencies (NASDA), US-AEP has provided small matching grants to small and medium-sized U.S. firms (SME's) to enable them to market their environmental goods and services in ways that build capacity in Asia. The program made grants in 46 states; these grants generated over $350 million in export revenues and led to the creation of more than 850 new U.S. jobs.

The Environmental Exchange Program (EEP), funded by the US-AEP and administered by the Institute for International Education (IIE), has facilitated meetings, tours, and information exchanges for some 4,223 Asian and American decision makers. In Asia, the extent of US-AEP partners is reflected in the scores of partnership arrangements, or Memoranda of Understanding, established between American states and Asian provinces, municipalities, universities, trade associations, and

NGOs, and also joint venture arrangements between Asian and American private sector companies. All are producing a desired multiplier effect in promoting US-AEP's policy agenda and program initiatives.

5. *US-AEP has established the kind of flexible program management structure that is needed to ensure the effective implementation and coordination of environmental improvement efforts, at the regional and country levels*

Over time, US-AEP's mode of operation has become more focused and structured, while retaining the capacity to be flexible in situations where flexibility is required.

a. The Secretariat

The Secretariat provides overall policy guidance in the design of the US-AEP's diverse program and coordinates the activities of its many implementing partners. It is responsible for developing and managing the US-AEP budget. Its staff members serve as liaison with its federal agency partners, and specifically with the U.S. Department of Commerce (DOC) and the U.S. Environmental Protection Agency (EPA). One of the Secretariat's staff members serves as the Contract Technical Officer (CTO) for US-AEP partners, whose services are acquired through contracts, such as the Louis Berger Group, Inc.; the Planning and Development Collaborative (PADCO); and the Institute for International Education (IIE). Secretariat staff members serve as Country Coordinators for all US-AEP activities which are implemented in Asian countries, and in which the US-AEP maintains a presence. They also perform the day-to-day monitoring of the activities of partners, whose services have been acquired through Inter-Agency agreements and through Cooperative Agreements.

b. Program Advisory Groups

Four Program Advisory Groups (PAGs) advise the Secretariat and its partners on the achievement of sector program goals and objectives. Membership in the PAGs includes representatives of all the partners whose activities contribute either directly or indirectly to the achievement of each sector program's goals and objectives. Each group is chaired by a member of the Secretariat, and is required to monitor the implementation of programs and activities and advise the Secretariat on the extent to which program objectives are being achieved. The Groups also provide input to and assess country and regional strategies and work plans, to ensure that program activities are being appropriately targeted to achieve expected results.

c. Field staff

Technical representatives were traditionally considered to be the core of the country teams, but other modes of staffing have been worked out in different countries in response to local conditions and to job requirements. In Indonesia, because it was difficult to find and keep technical representatives, a temporary position was created to handle the most urgent tech duties (receiving visitors, advancing urgent development programs, and responding to requests from other US-AEP offices). The position gradually became known as that of the Coordinator.

6. US-AEP has developed an overall strategic plan and country-specific strategies to guide the development and implementation of environmental improvement activities and programs

According to the US-AEP's Policy and Procedures Handbook, US-AEP prepared a Strategic Plan in May 1995, covering the period, 1995-2000. It has not as yet been updated, however, whereas US-AEP objectives have gone through various significant changes since the Plan was developed.

As noted earlier, the US-AEP currently has only one goal - " to promote a clean revolution in Asia"; and it has only one Strategic Objective - "sustained impact on the key people, institutions, and forces that drive the movement to a clean revolution in Asia". Accordingly, the US-AEP Results Framework, which is attached hereto as Exhibit 1, also serves as the program's strategic framework.

7. US-AEP has developed a program review system, whereby the country strategies are updated annually and accompanied by annual work plans that set forth the country-level activities that are to be implemented each year

The DA Evaluation Team found the country strategy that had been prepared for inclusion in the FY 2001 Work Plan for Thailand, and the Work Plan itself, to provide excellent examples of how the system is supposed to work. A copy of the US-AEP Thailand Program Strategy Framework, which was incorporated in that country's FY 2001 Work Plan, is attached hereto as Exhibit 2.

8. US-AEP has arranged for private contractors to provide the technical services and managerial support needed to assist in the implementation of the regional and country-specific strategies

Until last September, the International Resources Group (IRG) served as the Technical Services Support Contractor (TSSC) for the US-AEP, and provided a wide range of logistic, communications, and staff support services to the US-AEP Secretariat. Although there was a dispute over the awarding of a new TSSC contract last September, which is to be re-bid - a team from The Louis Berger Group, Inc. has served in that capacity since last September.

9. US-AEP has developed tracking systems that monitor program implementation and impact, and that provide feed back on the outcome and results of program-funded activities, enabling program managers to assess the outcome of these activities and share with others the results and best practices

In view of the incremental approach the US-AEP takes in implementing environmental improvement activities, and in view of the disparate nature of most of these activities, the USAID R-4 Results Reporting Framework appears to be well suited to the way that the US-AEP operates. Any plan to re-institute the Framework-based reporting system, however, should ensure that site-specific indicators are substituted for those that were being used.

10. The US-AEP program has contributed significantly to increased sales of U.S. environmental technologies

One of the cornerstones of the US-AEP strategy for advancing Asia's sustainable development goals is to promote the transfer of environmental technologies and practices to Asia through U.S. private sector trade and investment channels. Accordingly, US-AEP has established procedures to match the needs of Asian countries for environmental technologies with U.S. environmental technology providers.

US-AEP data indicate that, since its inception, the US-AEP Technology Transfer Trade and Investment program has matched over 700 Asian and U.S. stakeholders for the successful transfer of environmental technologies. This has been accomplished largely through training programs, workshops, exchanges, and small grants. It has been arranged through an extensive network of state trade offices, state development associations, world trade centers, and trade associations from 45 different states.

B. US-AEP REGIONAL AND FIELD-LEVEL ACCOMPLISHMENTS

The Evaluation Team found US-AEP field-level accomplishments, in particular, as providing a good indication of the extent to which environmental problems are being successfully addressed through US-AEP activities. They also provide a good indication of the synergy developed among the U.S. and Asian partners engaged in these activities. A listing and brief summary of several recent US-AEP regional and field-level success stories is contained in Exhibits 3-8 attached hereto. Among those cited are the following:

1. The Asia Region

The establishment of a Regional Environmental Center for Livestock Waste Management in Taiwan

In 1996, during a US-AEP needs assessment, the problem of treating livestock wastes was cited as a top environmental priority in the agribusiness sector in Asia. As a result, US-AEP led and organized a partnership of American equipment manufacturers and a consortium of five U.S. universities to design, in concert with Asian participants, an innovative treatment system that uses the latest American equipment and technology. The National Pingtung University of Science and Technology in Taiwan agreed to be the venue for the newly established Center. American equipment manufacturers contributed an estimated $500,000 of their technologies and services, while US universities contributed about $60,000 in engineering expertise. Taiwan invested nearly $2,000,000 for the construction and operation of the Center. The five American universities that participated have just completed technical performance testing of the innovative system, and have predicted that it will change the landscape of livestock management, not only in the U.S. and Asia, but worldwide, in the next decade. Further details concerning this activity are contained in Exhibit 3 and 4.

Expanding regulatory dialogue in Asia

Under the Environmental Regulatory Dialogue program, the US-AEP, the U.S. Environmental Protection Agency (EPA), and the World Bank and other donors are working to expand dialogue on

the adoption of improved environmental laws, policies and institutions. The individual participants and institutions involved in the program include Asian officials, judges, legislators, private sector business leaders, local groups, environmental groups, and universities. Each year US-AEP and its partners join with in-country agencies and organizations to implement a series of activities that support the development of draft laws, policies or regulatory action plans. Over the last two years, US-AEP has facilitated policy dialogue in Thailand, Vietnam, and the Philippines. While each country is at a different stage in policy formulation and implementation, due to varying legal, institutional, political and social structures - all exhibit a keen interest in having exchanges with regional and U.S. counterparts. Further details regarding this activity are contained in Exhibit 5.

Urban environmental management networking through the Mayors' Asia Pacific Environment Summit (MAPES)

US-AEP has been supportive of the MAPES since its inception in 1999. MAPES brings together more than 200 government officials, business representatives, and NGOs from Pacific Rim countries - to share information, best practice experiences, and strategies for improving urban environmental management. What makes MAPES unique is the tradition of those participating in the conference to pledge to undertake specific actions to improve environmental conditions in their localities. Pledges made by participants at a recent conference included commitments to build new wastewater and waste management facilities, to expand green space in their cities, and to develop long-term environmental plans for their communities.

2. Indonesia

The Water Efficiency Team (WET) project in Indonesia

Initiated by US-AEP in FY 1999, the project is designed to help fragile municipal water distribution enterprises achieve financial sustainability. It attracted USAID Mission follow-on funding and, to date, the project has enabled more than 370,000 community residents to receive piped water. In a related project, also initiated by US-AEP, some 30 surveys of consumer preferences were conducted. The results of these surveys have formed the basis for developing more comprehensive water enterprise corporate plans. Further information regarding US-AEP water and wastewater initiatives in Indonesia are contained in Exhibit 6.

3. Thailand

Promoting dialogue on Alternative Dispute Resolution techniques in Thailand

Under the Environmental Regulatory Dialogue program, the US-AEP and the U.S. Environmental Protection Agency (EPA) promote best practices, through exchanges between counterpart agencies, organizations and practitioners. In Thailand, despite the establishment of a comprehensive framework for environmental management, there are serious and on-going controversies related to industrial pollution, and the siting of municipal waste and water treatment facilities. Alternative dispute resolution (ADR) enables the settlement of disputes outside of the courts. Through ADR, parties resolve controversies through facilitation, mediation, or consensus building. For environmental disputes, ADR has proven to be an effective strategy for communities, industry and

government – in order to avoid costly and time-consuming litigation, and to build enduring partnerships. More details regarding this activity are contained in Exhibit 7.

Improving air quality in Thailand (Maryland Department of Environment)

For the past three years, the Maryland Department of the Environment has been working in partnership with the Thai Government's Pollution Control Department, USEPA, US-AEP, and the Thai government's Entrain program - to expand the capacity of the Thai federal and local environmental staff to address air quality challenges. One of the strengths of this project was the commitment to a strong partnership between the State of Maryland and Thailand. The partnership was exemplified by numerous exchanges. Over the past two years, Thai officials visited the U.S. nine times for onsite visits and training by Maryland's Department of the Environment. Maryland sent teams to Thailand five times to conduct training workshops and seminars. Due primarily to the strong partnership that developed, the project successfully met its goals. A model for air quality planning was developed to enable local officials in Chiang Mai to identify areas that were sources of air pollution, where the public could take action to reduce the pollution. As a result, Thailand gradually delegated the responsibility for air quality management from federal control to its provinces and municipalities. Further information concerning this activity is contained in Exhibit 8.

3. Philippines

Passage of a Clean Air Act

The passage of the Clean Air Act in 1999 is pressuring industry and government to take steps to decrease emissions and to increase monitoring. Under the umbrella of the Clean Air Act and the ADB-funded Metro Manila Air Quality Improvement project, US-AEP and USEPA spearheaded a public outreach campaign on the phase out of leaded gasoline, which is helping to promote public acceptance of the Act. US-AEP and the ADB currently support efforts to ensure nationwide acceptance. US-AEP continues to assist in implementing the Clean Air Act regulations, specifically the establishment of air quality governing boards, as well as helping to develop rules and regulations for implementing the Solid Waste Act.

III. IMPACT ON THE ENVIRONMENT AND ON ECONOMIC GROWTH IN ASIA

A. IMPACT ON THE ENVIRONMENT

1. Direct environmental impacts due to US-AEP interventions

The long-term impact of US-AEP efforts to improve public policies and environmental regulations

The recent ADP report, "Emerging Asia: Changes and Challenges", concludes that environmental degradation in the Asia and Pacific region has above all been a failure of policy and institutions. From this perspective, the US-AEP's efforts, along with those of the U.S. Environmental Protection

Agency (EPA), as well as the World Bank and other donors, to expand dialogue on the adoption of improved environmental laws, policies and institutions cited earlier - have been right on target.

Effective policies and laws can have far-reaching, direct, long-term impacts on the environment, human health and economic growth. The US-EAP Environmental Regulatory Dialogue is a field-based regional public policy initiative that catalyzes reform efforts, through targeted assistance to senior agency officials, legislators, environmental groups, and the media. A visit to the U.S. by Thai officials, along with follow-on workshops, contributed to the development of a ground breaking Public Consultation Law that directly engages the public in environmental decisions. Similar policy and regulatory reform efforts are also currently being pursued by US-AEP on an accelerated basis in Indonesia.

Through agency to agency exchanges with Thailand, Vietnam's National Environmental Agency is drawing on Thailand's experience and successes in this area, and is incorporating international best practices in its new Environment Fund. The Environment Fund will provide incentives for environmental investments and regulatory enforcement.

US-AEP collaboration with the Philippines Lake Laguna Development Authority has led to the implementation of an action plan for community based clean up and regulatory enforcement, through River Councils established by the Authority in 18 of the lake's 24 sub-basins. The collaborative efforts of the US-AEP and the Development Authority complement new World Bank pilot lending to strengthen the Authority's overall environmental capabilities.

The direct impact of technology transfers and investment on economic growth and the environment

US-AEP's Technology Trade and Investment program is driven by the needs of Asian public and private stakeholders to achieve continued robust economic growth without negatively impacting the environment. By effectively matching the U.S. environmental industry with Asian public and private sector shareholders, the program has impacted every major environmental sub-sector, from water and wastewater treatment to hazardous and medical waste, to municipal solid waste, to industrial clean production, to mobile and stationary air pollution. The program has also had a beneficial impact on the health and economic well being of a significant segment of Asia's growing population and the environment they live in. Two examples of how US-AEP has successfully matched American technologies to Asia's needs include:

- Arsenic removal from contaminated wells in West Bengal and Bangladesh, through the use of compact water treatment systems developed by an American firm.

- Use of a patented plasma technology to treat 20 thousand tons of stockpiled hazardous waste in Malaysia. This was the first use of plasma technology, which does not generate hazardous byproducts of incineration, to treat hazardous waste in Asia.

2. *The extent to which US-AEP has influenced decision-makers to adopt, develop and disseminate sound urban and industrial environmental management policies and practices, such as clean production*

In virtually all of the countries in which it has operated, the US-AEP has influenced decision-makers to adopt, develop and disseminate sound urban and industrial environmental management policies and practices. The results of these efforts are summarized below.

The targeted impact on urban residents of US-AEP efforts to improve urban environmental management

US-AEP has helped to strengthen some 66 non-governmental associations (NGOs) and networks in the U.S. and Asian countries; these associations have been organized around Asian urban environmental management issues. US-AEP also supports a number of professional environmental associations, such as the Solid Waste Association of the Philippines and the Indonesia Association of Sanitation Engineers. Similar associations assisted by US-AEP in India, have a membership base of over 1,000 urban environment management groups. Many millions of urban community residents will benefit from the efforts of these groups to guide local governments in the direction of environmentally sound and sustainable economic growth.

The success of US-AEP efforts to improve industrial environmental performance through the spread of due diligence practices

Throughout Asia, the industrial sector accounts for an increasingly larger share of overall growth, with most of that growth being financed by private sector debt financing. US-AEP has recognized that how Asian countries manage these funds is critical to sustainable development. US-AEP, acting on that insight, has nurtured multi-year partnerships with key banks and with the Association of Development Finance Institutions of the Asia Pacific, to promote environmental due diligence with investment committees. The results to date have been impressive. In the Philippines, for example, the Land Bank has set up a specific Environmental Unit tasked with environmental analysis of all project financing; expanded their capacity to finance waste and water projects; and incorporated environmental factors into its lending operations. In addition, the Development Bank of the Philippines, one of the country's largest financial institutions, is applying a code of environmental conduct for all banks that borrow from them. In Sri Lanka, credit procedures were revised at the Bank of Ceylon to include environmental factors.

The success of US-AEP efforts to improve energy efficiency through strengthened advocacy efforts

Two new trade associations of energy efficiency companies in Thailand were created with assistance from US-AEP in FY 2000 and 2001. One, the Energy Efficiency Development Alliance (EEDA), consists of large firms while the other, the energy Conservation Entrepreneurs Association (ECEA) consists mainly of individual professionals and smaller firms providing energy efficiency services. These associations provide an established platform from which energy efficiency businesses can work with the government on public policy and publicize the advantages of efficiency to the general public. The goal of US-AEP assistance efforts is to bring these two associations to the point where

they become influential, self-sustaining forces in Thailand, advocating energy efficiency over the long term. This goal is taking shape, as the two associations are gradually being recognized by the Government of Thailand as reliable sources of expertise and advice.

B. IMPACT ON ECONOMIC GROWTH IN ASIA

The ADP report, "Asian Environmental Outlook 2001", notes that expenditures on environmental programs in Asian countries have rarely exceeded 1 to 2 percent of their Gross Domestic Product (GDP). To meet the environmental program needs of the region, the report indicates that expenditures of at least 7 percent of the GDP will be required. It states that there is little evidence that such increases in environmental expenditures are being considered by policy makers in the region.

The ADB report further notes that informed and effective decision making requires a considerable amount of information on a wide range of environmental data and trends. However, even rudimentary environmental databases are lacking throughout the region. Systems of national accounts and other standard measures of economic performance and social well being exclude the costs and benefits associated with the use of environmental services, and thereby present a misleading picture of the economy. In any event, there appears to be little prospect that environmental accounting will become a mainstream component of development planning and national accounts in the Asia region in the near future.

In this context, the modest level of resources expended by US-AEP will likely not have a significant quantifiable impact on overall economic growth in Asia. Such impact is generally evident and usually computed on a site-specific basis. Moreover, it should be noted that the objective of the US-AEP vis-à-vis economic growth in Asia, is not so much to register measurable impact on it, one way or the other, as it is to transform the way it is achieved in terms of its effects on the environment. US-AEP's efforts are aimed at ensuring that whatever economic growth is achieved, should not be achieved at the cost of further degradation of the region's environment. .

1. The relationship between environmental preservation and economic growth

As noted in the ADB's report, Asian Development Outlook 2001, current global development patterns, as perceived by the World Bank, indicate that economic globalization will intensify over the next two decades. International webs of trade, investment and market connection will deepen and become more geographically extensive. Despite concerns over globalization, international trade and market inter-connections will likely remain the development model of choice within the Asia region. The role of large, multinational corporations will continue to grow, partly through a consolidation in which industries worldwide become dominated by a smaller number of multinational corporations. Harnessing economic globalization to address the goals of poverty reduction and environmental degradation is likely to emerge as one of the greatest policy challenges facing the leaders of the ADB's developing member countries (DMCs), over the next decade.

2. The major direct beneficiaries of program implementation

US-AEP has estimated that some 1,967 public and private institutions (of which two-thirds are Asian institutions) were engaged in one or more US-AEP-supported activities in FY 2001. More than half of these activities were focused in three sectors: waste water, air pollution, and industrial

environmental management. A total of 671 Asians participated in one or more US-AEP-supported educational exchanges, while 297 Asians participated in US-AEP-supported trade shows in the U.S.

An estimated 370,000 Indonesian citizens were the beneficiaries of a US-AEP program (undertaken in collaboration with USAID/Jakarta) that kept clean water flowing to fifty rural enterprises that were on the brink of bankruptcy. The citizens of Singapore will soon benefit from the construction of a new state of the art wastewater facility, for which an American company was awarded contracts to do a feasibility study and engineering design work, with US-AEP assistance.

IV. THE EFFICACY OF THE US-AEP'S "PARTNERSHIP APPROACH"

The efficacy of the US-AEP's "partnership approach" centers around the versatility that it offers in dealing with a variety of environmental problems in a number of different cultural, economic, political, technological, and geographic settings. As indicated below, there has been a number of key adjustments over the past ten years in US-AEP's mode of operation, as it has evolved in response to changing circumstances and periodic changes in leadership. Versatility was a key factor enabling program managers to continue to operate effectively despite these adjustments.

Bearing in mind that the initial goal of the US-AEP was "to harness U.S. expertise to address the serious environmental problems in Asia", US-AEP has harnessed a broad range of U.S. expertise through its "partnership approach". While the program's American partners were of great assistance on the input side, its Asian partners were of equal value in bringing program activities to successful conclusions on the applications side.

A. A CHRONOLOGY OF KEY ADJUSTMENTS IN THE US-AEP'S MODE OF OPERATION

Since its inception in 1992, US-AEP has been evolving in terms of its strategic objectives as well as its program focus. Initially, US-AEP placed heavy emphasis on promoting trade and investment, i.e., the sale of U.S. environmental technology, equipment and services to Asian countries. In the mid-1990s, however, a change of leadership led to a fundamental shift in program emphasis. This included an expanded focus on development programming and activities, and a new strategic focus on long-term partners. Emphasis was put on clean air, clean water, wastewater recycling, solid waste disposal, medical and hazardous waste disposal, and environmental management systems. US-AEP signed an Inter-Agency agreement with the U.S. Environmental Protection Agency to provide technical leadership in the areas of policy development, regulatory support, industrial compliance and technical assistance, and in urban pollution reduction and urban infrastructure. Under a directive from the ANE Bureau, US-AEP stopped working in bio-diversity as an area of environmental focus. It also stopped working in the energy sector.

In 1996, the Clean Technology and Environmental Management (CTEM) program was initiated by US-AEP as its industry program. The objectives of the program were to promote in-process industrial pollution prevention and the achievement of sustainable development through market mechanisms. The advent of the CTEM program placed new emphasis on activities relating to regulatory and policy issues affecting the environment. Reaching key policy-makers, and assisting them in identifying and implementing the policy changes needed to promote cleaner industrial environmental performance, became a high priority.

US-AEP introduced the idea of a sponsoring a "clean revolution" in 1997. Progress in promoting the idea is reflected in its collective endorsement by the Asia Pacific Economic Cooperation (APEC) ministers for science, technology and the environment. The Greening of Industry Network (GIN) agreed to expand its reach in 1997, authorizing the organization of its first institutional base in the developing world at Chulalongkorn University in Thailand.

Also in 1997, the ASEAN Institutes of Strategic and International Studies launched a framing activity, in collaboration with Clark University and the US-AEP Policy Group, to promote to their national policy-making constituencies the idea of industrial transformation as a development goal and environmental indicator. The National Pollution Prevention Roundtable (NPPR) replicated round tables in Indonesia and the Philippines, in both cases using the transformation agenda as the organizing premise.

In 1998, greater emphasis was given to laws and regulations, and the technical assistance to implement them. A Regional Urban Strategy was developed, with programs in five countries. Country programming was initiated, which entailed developing country strategies and annual work plans, a Results Framework, and a. Performance Monitoring Plan. MAPES was launched in 1999. US-AEP strengthened its partnership with the ADB, and began to work with the ADB on policy development and on other environmentally-related activities.

In 2001, US-AEP began working with Thammasat University in Thailand to strengthen the University's nascent environmental law graduate program, by facilitating the establishment of a partnership between its program and George Washington University's Environmental Law Program. Educational exchanges between the two universities have resulted in a formal mentoring partnership, encompassing the development of a curriculum, founding an environmental law journal, the establishment of an environmental legal clinic, student exchanges and continued staff development. The regulatory dialogue was launched in Thailand. The Department of Commerce announced that it was terminating its support for the Tech Reps in the five Advanced Developing Countries. Also in 2001, US-AEP put out bids for a new Technical Services and Support Contractor (TSSC), in a move that would also combine most of its technical services and support requirements under one contract. And, US-AEP moved to develop new relationships with the ADCs, based on their agreeing to contribute their own resources for proposed joint activities with LDCs.

B. THE EXTENT TO WHICH THE US-AEP "PARTNERSHIP APPROACH" HAS BEEN EFFECTIVE IN ACHIEVING RESULTS AND IN ADVANCING USAID DEVELOPMENT GOALS IN THE ANE REGION

US-AEP began in 1992 with a vision to approach development assistance in two new ways. One was to tie development to U.S. exports, in order to incorporate environmentally beneficial technologies from the U.S. into Asia's burgeoning stock. The second was to create partnerships that would continue to promote sustainable development, beyond the reach and longevity of development assistance programs, and thereby draw upon the resources and experience of public and private organizations that would not otherwise be engaged in the development assistance process.

The overall accomplishments cited in Sections II.A and II.B above attest to the extent to which the US-AEP "partnership approach" has been effective in achieving these results. The approach has been particularly effective in facilitating interaction between public and private entities; in making

arrangements for broad-based participation in conferences and workshops; and in expediting the replication, across country lines, of successful and replicable activities, such as the Regulatory Dialogue and country efforts to phase out leaded gasoline.

Having "high-profile" institutions such as the ADB and the World Bank as partners, has been rewarding and beneficial to the US-AEP. The same applies with respect to its partnerships with the U.S. Department of Commerce and the EPA, the Ford Motor Company and Hewlett-Packard. As noted earlier, the Maryland Department of the Environment worked closely with the Thai Government's Pollution Control Department, USEPA, US-AEP, and the Thai government's Entrain program in successfully expanding the capacity of Thai federal and local environmental staff to address air quality challenges. Also, notwithstanding its penchant for operating independently, to the extent that the US-AEP has achieved its targets, it has thereby also advanced USAID development goals in Asia.

Perhaps the ultimate standard by which to judge the effectiveness of the US-AEP "partnership approach", is to note that it is the model for a similar organization being developed by the European Union, that also proposes to work with key decision-makers and to provide sustainable solutions to Asia's environmental problems.

C. THE EXTENT TO WHICH USAID'S INTERAGENCY PARTNERSHIP WITH THE DEPARTMENT OF COMMERCE AND THE ENVIRONMENTAL PROTECTION AGENCY HAVE ENHANCED THE ABILITY OF USAID TO ADVANCE US-AEP GOALS

USAID's interagency partnership with the Department of Commerce has greatly enhanced the ability of USAID to advance US-AEP goals, specifically with respect to their combined efforts to increase the transfer of U.S. environmental technology, expertise, and practices to Asian countries to effect needed environmental improvements. As indicated below, as a result of the decision by DOC to terminate its participation in US-AEP activities, it will take some time for US-AEP to regain the institutional development momentum that it had finally achieved after ten years of effort.

On the basis of interviews conducted both in Washington and in the field, the Evaluation Team has concluded that the EPA relationship with US-AEP could be made considerably more effective. This will require that the EPA be induced to establish the same degree of collaboration with US-AEP offices in other beneficiary countries, as it has in Thailand. What's needed is a composite EPA work plan of both country and regional initiatives and the greater provision of specific technical expertise targeted cooperatively by the EPA and US-AEP. Available EPA funds should go directly to EPA regional offices to ensure effective programming. Currently, EPA inputs to US-AEP activities are mainly U.S.-driven.

D. THE EXTENT TO WHICH US-AEP LEVERAGES PRIVATE SECTOR, MULTI-LATERAL AND NON-GOVERNMENTAL INVESTMENT IN ENVIRONMENTAL MANAGEMENT; THE EXTENT TO WHICH EXCHANGES OF BEST PRACTICES AMONG U.S AND ASIAN COMPANIES, PROFESSIONAL AND INDUSTRIAL ORGANIZATIONS, GOVERNMENT AGENCIES AND LOCAL AUTHORITIES, IMPACT ON ENVIRONMENTAL MANAGEMENT

US-AEP generally asks for cash or in-kind contributions, depending upon the advancement of the country and the sector. This approach works well with the ADB and the World Bank. As to the question regarding the extent to which exchanges of best practices among U.S and Asian companies, professional and industrial organizations, government agencies and local authorities, impact on environmental management - the Evaluation Team was told that exchanges of best practices often emphasize concepts, core ideas, and approaches that can't be recognized instantly as benefits. Yet exchanges have resulted in PERPAMSI in Indonesia, for example, emphasizing consumer orientation and full cost recovery. This approach was picked up at MAPES and in Honolulu for water.

Data provided by US-AEP indicate that 195 U.S.-Asia partnerships have been formed since the program began - partnerships being defined as relationships involving a written Memorandum of Understanding, or the shared commitment of significant financial resources. Through its partnership with the Council of State Governments (CSG), 36 environmentally related projects have been undertaken involving 23 states, 11 Asian economies, 83 U.S. companies, several dozen NGOs, and 35 academic institutions. For every USAID dollar allocated to these activities, partners have contributed an average of $1.50.

The environmental management improvement results achieved through this approach have been impressive. Some 15 large U.S. companies with suppliers in Asia, have adopted programs to promote environmental management among their suppliers. Approximately 41 environmental laws and regulations have been drafted or improved by Asian governments, as a result of U.S.-AEP assistance. Working with Supreme Court justices, lawyers, legislators, and regulatory officials, US-AEP is helping pollution control efforts in Thailand, by working with advocacy groups to strengthen its regulatory capacity and enforcement, and by getting local government units and the residents of local communities involved in the process.

E. THE EXTENT TO WHICH SUPPORT FOR NETWORKING, POLICY DIALOGUE, ROUNDTABLES, WORKSHOPS AND REGIONAL MEETINGS INFLUENCES ASIAN APPROACHES TO ENVIRONMENTAL MANAGEMENT

Optimally, these activities influence key decision-makers, by helping to develop their thinking, and eventually their actions. It is important to nurture these relationships, which requires US-AEP follow-up to ensure their continued participation in US-AEP program activities. In fact, efforts to nurture these relationships are of considerable importance, in that most regional projects are conceived, developed, and implemented in the field.

F. THE EXTENT TO WHICH US-AEP'S IDENTIFICATION OF TRADE LEADS AND MATCHMAKING SUPPORT TO U.S. AND ASIAN COUNTRIES HAS CONTRIBUTED TO THE EXPORT OF U.S. ENVIRONMENTAL TECHNOLOGIES AND SERVICES

Through its partnership with the National Association of State Development agencies (NASDA), matching grants are provided to small and medium-sized U.S. enterprises (SMEs), to market their environmental technologies, goods, and services to Asian business firms and to government agencies in ways that increase their capacities to address environmental problems. NASDA has made grants to U.S. SMEs in 46 states. The grants have helped to generate over $350 million in export revenues and have created an estimated 850 new jobs.

G. THE EXTENT TO WHICH US-AEP'S SUPPORT FOR ASIAN COMPANY PARTICIPATION IN U.S. TRADE SHOWS HAS CONTRIBUTED TO THE EXPORT OF U.S. ENVIRONMENTAL TECHNOLOGIES AND SERVICES

Team interviews with DOC officials indicated that there was very little "bang for the buck" in terms of satisfied U.S. clients, given the money and time spent. In addition, it was noted that a US-AEP contractor had prepared an assessment of Asian company participation. He concluded that there was much spinning of wheels, phone calls to Embassy offices, seminars, trips, a 10-day conference. There was lots of glitter, not many deals were made, and there was no bottom line. There was no monitoring of the achievement of goals, and no targets were set. Third echelon business cards were left. Money was misspent. It was a money-draining program, and nobody was volunteering to rationalize the process.

H. THE EXTENT TO WHICH THE US-AEP APPROACH DIFFERS FROM THAT OF OTHER MECHANISMS BEING USED BY USAID TO ADDRESS SIMILAR PROBLEMS

It is very different. US-AEP is much more flexible, responsive, and innovative. It brings in more US partners, and can choose to work with the best local partners. Also, US-AEP staff members generally know a country's environmental situation better and are able to work more closely with local partners. The US-AEP approach puts more emphasis on U.S. partners, but the key difference from other USAID mechanisms is the uninterrupted years of in-country presence of US-AEP personnel and the innovative, flexible, rifle-shot, response to the environmental problems that it addresses. Moreover, US-AEP doesn't have to deal with the traditional USAID way of doing things. It is focused on "end-of-pipe" technology. It has gotten things going. It lends itself to a campaign-type approach.

V. THE EXTENT TO WHICH US-AEP ACTIVITIES COMPLEMENT USAID COUNTRY DEVELOPMENT STRATEGIES

In Indonesia, in energy and clean air, there is close cooperation and mutual enhancement between the USAID Mission and the US-AEP. For the introduction of the State Legislative Leaders Foundation (SLLF) to Indonesia, US-AEP put in $25,000, and the Mission provided $125,000 that was administered by the US-AEP. While the USAID continues to include the SLLF in its country program, the Foundation expects to receive $150,000 from the UNDP and $25,000 from the General Electric Foundation to continue its seminars and courses for Indonesian legislative leaders. In

Indonesia, USAID has relied on the results of US-AEP projects for its own R4 results. US-AEP projects have led directly to effective USAID projects in several cases.

In Indonesia, the US-AEP strategy to increase community access to piped water, complemented the USAID's strategy of enhancing the capability of local governments to provide such access. Currently, US-AEP is seeking to help the mission by preparing a composting activity for follow-on mission funding with earmarked agricultural funds.

In the Philippines, there were a number of energy exchanges which the USAID/Philippines funded but asked the AEP to do it for them. The USAID Mission in India copied the US-AEP industry environmental program in 1996. There was an exchange buy-in to support the South Asia Regional Initiative (SARI), a broad energy program.

How does work in developed countries (e.g., Singapore and Taiwan) further USAID development goals?

It shows the extent to which successful environmental initiatives can impact the health and well-being of various segments of the population. For example, the Alliance to Save Energy program is now being replicated in Indonesia and Thailand.

VI. CHANGING CONDITIONS IN ASIA AND THE RELEVANCE OF THE US-AEP MODEL

As a result of globalization, Asia is increasingly becoming a distinct economic system. The emerging political structures in Asia – ASEAN and APEC – are being built on the realities of regional economic integration. US-AEP operates in 11 Asian economies and is strategically poised to promote progress on cross-border environmental issues such as improving air quality.

An estimated 80 percent of Asian industry will be newly built in the next 20-30 years. The environmental implications of these new investments, and their benefits for the US, in terms of the export of environmental goods and services, are of major interest to USAID and to the US-AEP.

The ADB has noted that over the last two decades, Asia's developing economies have established legal systems and institutions to oversee environmental protection. However, reviews of environmental performance in the region in the late 1990s, revealed that the environmental quality would continue to deteriorate if environmental governance agencies continue to operate in a "business as usual" manner. With a few notable exceptions, Asia's developing economies have failed to make environmental protection a policy priority and have not put in place policy frameworks and institutional resources that would ensure compliance with stated environmental goals.

A. THE APPLICABILITY OF THE US-AEP APPROACH TO OTHER REGIONS

The US-AEP approach is applicable to other regions, and there is a market for the approach in other geographic regions. However, considerable attention would need to be given to ensuring that the Asia model is appropriately adapted to the environmental, industrial, political and cultural conditions of the other regions. Asia's business culture lends itself to the current US-AEP model. In fact, the

current model, as it stands, reflects a host of modifications that have been made - as it has evolved over the past ten years.

The EcoLinks program, launched by the Eastern Europe/Eurasia Bureau in 1999, is aimed at promoting sustainable relationships among businesses, local governments, and trade associations in Eastern Europe and Eurasia. Results, to date, include success stories such as the strategic partnership formed between a Czech based company, SOKOFLOK, and LightStream Technologies of the U.S. Over 150 units of patented UV water disinfecting units will be sent to Prague for municipal and industrial applications. The units, which eliminate the need for chlorine, chemicals and mercury bulbs, represent a $10 million export sales transaction.

The US-LAC Environmental Partnership was launched by the LAC Bureau to improve the performance of targeted LAC businesses and communities. The program works to identify, introduce, and disseminate environmentally sound technologies and practices, targeting sectors such as shrimp, aquaculture, water/wastewater, and mining. In the hotel and tourism industry, the US-LAC Environmental Partnership has introduced environmentally sound best management practices, developed in Jamaica, to countries in Central America, as well as to Ecuador and Mexico.

B. THE EFFECT OF THE DECISION BY THE DEPARTMENT OF COMMERCE TO TERMINATE ITS PARTICIPATION IN US-AEP ACTIVITIES

The effect of the decision by the Department of Commerce to terminate its participation in US-AEP activities, has been to disrupt the emergence of the kind of institution that will be critically needed over the next decade to bring balance to the conservation protection vs. economic (and population) growth duel currently raging in the Asia region. It will take some time for the US-AEP to regain the institutional development momentum that it had finally achieved after ten years of effort. As indicated in Exhibit 9, attached hereto, the economic (and population) growth forces appear to be winning in the Philippines. DOC's withdrawal from the US-AEP program will complicate efforts to restore the balance there.

C. THE "NON-PRESENCE" ISSUE AND ITS EFFECT ON THE PARTICIPATION OF ADVANCED DEVELOPED COUNTRIES (ADCS) IN US-AEP ACTIVITIES

All five ADC countries want to buy back into the program, and have tentatively been given the go-ahead. Arrangements could be set up, through MOUs, between the US-AEP and the ADCs.

Projects launched in the ADCs have served as models for the introduction of similar projects in the six Less Developed Countries (India, Indonesia, the Philippines, Sri Lanka, Thailand, and Vietnam), in which the US-AEP has continued to operate jointly with the DOC, but primarily with USAID funds. But that situation is also changing: the DOC has announced that it plans to also disassociate itself from the US-AEP in the LDCs, effective September 30.

Accordingly, the US-AEP is currently exploring various options for continuing to engage the five ADCs in its activities in the LDCs. It is also establishing a new support structure for the continued operation of its Offices of Technology Cooperation in the six LDCs, and for continued support for a modest level of activities in two other LDCs (Nepal and Bangladesh), where there is no US-AEP staffing presence.

Over the past several months, the US-AEP has identified prominent public and private sector entities in each of the five ADCs that have expressed a strong interest in serving as US-AEP "liaison" in their countries. This has led them, in some cases, to consider establishing an alliance for joint planning purposes and to also consider providing funding from their own resources to the LDCs.

US-AEP efforts to establish a new support structure for the US-AEP Offices of Technology Cooperation in the six LDCs are just getting started. They will be focused heavily on forging a new relationship with the USAID Missions in these countries.

VII. THE EXTENT TO WHICH US-AEP OPERATIONS HAVE BEEN COST EFFECTIVE

A. DISCUSSION

The Evaluation Team review of US-AEP's program, operations and budget indicates that the USAEP is a cost-effective model for USAID's advancement/achievement of its environmental goals. This judgment reflects US-AEP's:

- relatively low program cost, i.e., $10 to $17million per annum, or approximately six tenths of one percent of USAID's annual budget, or equivalent to the Mongolia Mission's annual program;
- *de minimis* share of the total USAID environmental budget (i.e. approximately 2% of AID's 2002 budget request for the environmental sector, $633 million);
- relatively low cost of individual activities;
- cost sharing with partners;
- significant program accomplishments;
- significant leveraging of other donor resources.

Measuring the cost effectiveness of the USAEP is difficult. USAEP's goal and strategic objective are not easily reduced to quantification, or at least quantification which captures the essence of US-AEP's mission, i.e., to catalyze Asian governments, institutions and individuals to focus their attention and efforts on avoiding an environmental catastrophe by reducing the negative environmental consequences of economic growth.

USAEP's goal and strategic objective reflect a process or movement, rather than a discrete and static event. As such, it is best measured over time by proxies of change, i.e., activities such as the introduction of legislation and new management methods of addressing environmental issues; the introduction of new and environmentally appropriate technology; and the commitment of scarce resources to environmental issues and problems.

Program characteristics of the US-AEP that reflect its cost effectiveness, include its flexibility and ability to respond to different management and programs requirements, the degree of cost sharing with partners, its ability to leverage other funding, replication of its activities, and its ability to effectively spread or to wholesale its message.

B. MANAGEMENT EFFECTIVENESS

The Evaluation Team believes that management effectiveness and program flexibility are organizational characteristics consistent with the concept of cost effectiveness, although they are not synonymous.

Since 1992, US-AEP has worked in a total of 13 countries, and has carried out more than 5,000 individual educational exchanges. The total cost (obligations) for US-AEP, during this period, has been approximately $168 million. USAEP has used approximately 30 separate contract or procurement vehicles to implement this program.

US-AEP has also created 292 partnerships with US and Asian institutions, and has involved 48 states in the development process in Asia.

Managing this complex effort has required US-AEP to adopt different management structures to respond to local conditions, i.e., ADCs, non-presence countries and AID Missions with different program and management interests.

The US-AEP is currently managed by a Secretariat of 8 professional and administrative staff, including 1 PSC in Asia. The Secretariat is presently supported by contracts and partners (i.e. the Council of State Governments), with a total professional and administrative staff of 77 in Washington and overseas (as of 5/1/02).

The overseas component of this contract staff is thirty-four, and it includes both professional and administrative staff assigned to Asian offices in Manila, Jakarta, Bangkok, Hanoi, Colombo and India. (See Exhibits 10 and 11 for an organizational chart and staffing pattern).

The US-AEP has operated overseas with institutional contractors (e.g., the Louis Berger Group, PADCO, IRG) and U.S. and local personal service contractors. It has shared office space with the U.S. Foreign Commercial Service. The total cost of running all field operations in all 11 US-AEP countries was $1.9 million in FY2000 ($173,000 per country).

Field management arrangements

A major reason for this exceptionally low operating cost has been the extensive use of resident host country and expatriate staff. Typical salaries run from a high of $25,000 for a very senior person in India, to a low of $7,000 per annum in Sri Lanka. Locally hired, experienced expatriates are earning $40,000 to $50,000 per annum, vs. the AID average of $250,000 per annum for U.S. personnel located overseas.

US-AEP has demonstrated flexibility in developing management arrangements reflecting the local situation and AID's interest. In Thailand, US-AEP followed the lead of AID and developed a

partnership relationship with the Kenan Institute, as a follow up to the USAID Mission-run program. In Indonesia, USAEP has managed its activities, in conjunction with and support of the USAID, with joint funding of a water resources specialist in the Mission and contract staff, in the U.S. Foreign Commercial Service office (FCS). In the Philippines, USAEP has had a resident team of contractors working within the USFCS and the ADB. Collaboration with the Mission has included members of the USAEP staff working within the Mission. In the ADCs, USAEP managed its operations as an integral part of the FCS. A US PSC manages USAEP's regional activity out of Manila.

Washington management arrangements

The Washington based management consists of a staff of 8 direct hires forming a Secretariat, a technical support services contractor (Louis Berger), and four partner organizations. Direct hire and contractor staffs are organized into Program Advisory Groups, which provide policy and program development services.

US-AEP's Washington operation does not share the same cost effective image of the field. Washington contractor activities include program development and implementation and management services to the Secretariat. Historically, the US-AEP has used numerous U.S. contractors and partners to develop and implement its program. The number of staff represented by the Secretariat, contractors and partners, has raised questions about the cost effectiveness of US-AEP's Washington operations and which functions can reasonably be transferred to the field or eliminated. The one program, which the Evaluation Team believes can be transferred, is the ETNA Trade Links Program.

In terms of any transfer of functions and staff to the field, any reduction in Washington staff is offset by the significantly higher per person cost, if a U.S. citizen fills the overseas position. Alternatively, using the existing US-AEP model of hiring local staff and resident expatriats, the transfer of functions would result in a corresponding net cost savings.

However, care should be taken not to try to compare the US-AEP staffing with a "typical" USAID mission. US-AEP's model is labor intensive and a good deal of its efforts are directed toward working with U.S. organizations and in developing the policy and strategic framework. With a field operation staffed by host country nationals and U.S. PSCs, there is an increased burden on Washington to provide policy oversight and supervisio.

Specifically, US-AEP's mode of operation is to develop and work with numerous U.S. and Asian partners, and to implement its activities through small exchanges, conferences and workshops. The US-AEP has a multi-program focus (see Exhibit 12) including environmental policy, urban infrastucture, industry and technology transfer, and, finally, it is regional in scope.

US-AEP has not been inattentive to the issue of a large Washington based contract staff, and this issue was a major reason underlying US-AEP's effort to consolidate contractor activities and functions under one contract. As a result of this consolidation, total contractor and partner staff (Washington & Asia), has been reduced by 10 (from 53 to 43). Transferring the ETNA program to the EGAT Bureau and the termination of the of an AAS fellow position in September 2002 will reduce the Washington staff to a total of 40.

C. PROGRAM FLEXIBILITY

Most US-AEP program initiatives are small investments (i.e. $5,000 for exchanges to $150,000 for NASDA grants and $25,000 for CSG grants), and $173,000 for a demonstration Clean Air Partnership with Chiang Mai and the Maryland Department of Environment. US-AEP activities are usually undertaken with partners as educational exchanges, conferences etc., and in some instances there are projectized efforts focused on, e.g., improved water or air quality. The relatively small investment of US-AEP funds in any one activity allows US-AEP to act as a catalyst and innovator, yet not committing the large resources typical in most AID projects. Many of US-AEP's activities are undertaken by and with private partners, and US-AEP has the flexibility to close down an activity quickly, at minimal cost.

The US-AEP program has demonstrated creativeness and flexibility in its development of programs that are complementary and supportive of different Missions, each with their own strategy and modes of operations.

US-AEP has provided direct assistance to USAID Mission projects in Indonesia, India and the Philippines, and has provided project design assistance to USAID/Cambodia.

D. SPREAD EFFECTS

USAEP is modeled on the concept of a wholesaler of development ideas and technology. It develops partnerships that will, in many cases, continue after USAEP funding is gone, and will continue to deliver the ideas initiated by USAEP.

Examples of this cost effective technique include: the introduction of Environmental Management Systems into 12 national development banks, which deal with small and medium size businesses; the introduction of the Greening of the Supply Chain concept to 15 large corporations, which passed the concepts of more effective environmental management to more than 3800 small and medium size businesses in Philippines, India, Thailand, Malaysia and Indonesia

E. COST SHARING

USAEP has operated under a management criterion of partners sharing in the cost of activities. Sometimes referred to as "leverage", the total cost sharing with actual partners, over the period 1992-01, is approximately $183 million (see discussion below).

As an example, USAEP's partnership with the Council of State Governments (CSG) has resulted in more than $5.2 million of partners' funds being invested in 30 projects, involving 232 states and 11 Asian economies.

F. LEVERAGING

USAEP's leveraging of USAID Missions and other donors resources has been significant:

During the period 1992-2001, USAEP has leveraged approximately $183 million for economic and environmental development from private and governmental partners. USAID's investment through

USAEP, during this period, has been approximately $168 million. USAID has leveraged its investment ($168 million) by 109%. The amount leveraged ($183 million) represents 52% of the total USAEP program cost.

In 2001, USAEP reported leveraging $9 million from public and private sector partners, against a USAID obligation of $16 million (equal to 56% of the total USAID funding), or 36% of US-AEP's total resources.

G. REPLICATION

The USAEP has served as the direct model for the E&E Bureau's Eco-Links Project and for the conceptual underpinning of the Agencies Global Development Alliance. The USAEP model has also been copied, as a development tool, by the European Union (EU-ASIA PRO ECO). USAID Missions in India, Philippines, Indonesia and Bangladesh have adopted USAEP initiatives, bought into USAEP programs, or agreed to co finance USAEP activity;

H. ILLUSTRATIVE US-AEP ACCOMPLISHMENTS AND COSTS (1995-2002)

The Evaluation Team has identified the following examples of project decisions taken by Asian decision makers, which we believe, are due, at least in part, to USAEP's efforts, and which reflect this broader program goal and objective. These achievement and benefits and the approximate costs are summarized below:

1. Phase Out Of Lead Free Gas

USAEP has provided assistance to Vietnam, Philippines and Indonesia in the analysis of the problems created by leaded gas and in drafting appropriate remedial legislation. This activity was undertaken in collaboration with other donors, particularly the ADB. The direct benefits of this activity are an estimated 155 million people in Vietnam, Philippines and Jakarta, who will benefit in terms of reduced lead/blood levels and reduced respiratory illnesses. There are an additional uncounted number of beneficiaries in Laos, Cambodia and Indonesia. A related benefit of reduced blood/lead levels is a positive correlation with child mental development. The direct cost of this activity has been $252,000, through FY 2002. AEP has leveraged its inputs, with funds from the ADB and from the national governments.

2. Policy Dialogue

USAEP has worked with the Governments of Thailand, the Government of the Philippines and the NGO community to strengthen the enforcement of environmental laws and to help develop innovative legal and regulatory enforcement strategies that build on international experience. Efforts in Thailand include assistance, at the national level, to the GOT - to establish a new Ministry of the Environment and, at the local/NGO level, to mobilize citizen involvement in environmental issues, enforcement of environmental laws & regulations, and increased compliance.

USAID/Cambodia's "Accelerating Economic Reform in Asia" project utilizes the expertise of USAEP contractors, based upon work done on civil society issues, under USAEP's support of environmental ministerial reform in Thailand. The benefit of this activity is an improved legal and

regulatory system for environmental issues and increased citizen participation in local governance. The USAEP Policy Dialogue activity has assisted USAID/Cambodia and the ANE Bureau. The cost of this activity has been $725,000, through FY2002.

3. *Greening the Supply Chain*

This activity has mobilized large international corporations, including the Ford Motor Co. and Nestle Philippine, to introduce environmental awareness and compliance to more than 3,800 small and medium industries in their supply chain. The program has also been operational in the Philippines and India. This activity has also had a direct impact on how large international and small and medium size companies in the Philippines, India, Thailand and Malaysia deal with the environmental aspects of their businesses. This has included the introduction of environmental management concepts into their operations. USAEP cost for this activity has been $312,000. USAEP leverage includes working with the Ford Motor Co. in the Philippines, where 100% of its first tier suppliers have participated in cleaner production, and it has mandated that all their suppliers must be ISO 14001 certified, by December 200. USAEP estimates that Ford has invested $60 million in its suppliers to help them achieve company environmental goals. UTC contributed $400,000 to this program, and Nike and Ford are estimated to have contributed more than $1,000,000.

4. *Indonesia Water Project (WET)*

USAEP has provided assistance to local water authorities to improve their management and financial conditions. The benefits of this activity have been improved water to almost 600,000 people in Indonesia. This was accomplished at a cost to USAEP of approximately $380,000. USAEP's investment led to a USAID follow on activity and investment of $6 million in technical assistance. In total, USAEP leveraged $24 million (64 times USAEP investment) from USAID, the World Bank and the Government of Indonesia.

5. *MAPES*

The Mayor's Asia-Pacific Environmental Summit (MAPES) and annual technical meetings bring together more than 200 to 400 local and national government officials, business representatives and non-governmental organizations - to share information, best practices, and strategies for improving urban environmental management in Asia and the Pacific. The benefits of the MAPES activity are the raising of awareness of urban environmental issues and the sharing of environmental best practices, strategies and experiences between Asian and U.S. mayors. The MAPES summit meeting and technical meetings have resulted in public commitments by Asian mayors to undertake specific environmental actions, including a pledge by Ahmedabad, India to construct new sewage treatment plants, a city wide solid waste plan to eliminate open waste storage, and the provision of essential services to slum areas of the city. Bangkok pledged to expand its green fleet program (begun with USAEP assistance), and to construct a new wastewater treatment facility by 2004.

At the 2001 MAPES Summit, governors, mayors and other local government officials from 27 different Asian cities, made individual commitments for environmental improvement in their communities. At the conclusion of the MAPES Technical, in March 2002, the City of Honolulu announced the creation of a new institution focused on Asian environmental issues, namely, the Asian Pacific Urban Institute. USAEP's investment in MAPES was $79,500. Other donors have

joined USAEP in support of MAPES, including the ADB, the UNDP, CIDA and the World Bank. Total contributions from other donors totaled $105,000, plus approximately $49,000 from Asian participants.

6. Technology Transfer

US-AEP's early years were dominated by the focus on U.S. environmental technology as the solution to Asia's environmental problems. The effort to link U.S. technology to Asia's environment was fundamental to the creation of the US-AEP, and was implemented through a Memorandum between USAID and the Department of Commerce. Under this MOU, DOC recruited and jointly funded with US-AEP, the assignment of Tech Representatives in Asia. The DOC terminated this agreement in 2001, citing its reduced budget as the reason.

By all accounts, US-AEP's technology transfer program was successful and, over the course of the past 10 years, has contributed to the sale of approximately $1.4 billion of U.S. environmental technology in Asia. Interviews with FCS officers in Singapore, Thailand, and at the ADB, as well as the U.S. Representative to the ADB, strongly endorsed the US-AEP program. All regretted the DOC decision to terminate its involvement. Representatives of the U.S. business community also have expressed strong support for the program.

7. Program Emphasis

Several individuals interviewed during the course of this evaluation, questioned US-AEP's effectiveness and its developmental impact, noting the "emphasis" on selling U.S. technology and they expressed the belief that enumerating the numbers of exchanges or conferences did not constitute development impact. The Evaluation Team agrees with the latter observation, but notes that AID and the ANE Bureau accepted these indicators as valid and appropriate. The indicators included in the R4, are an attempt to quantify as proxies what is inherently difficult or impossible to quantify, i.e., "influencing decision makers."

The Evaluation Team also found that the perception of an "emphasis" on selling US technology is both misinformed and a continuing problem for US-AEP. This perception is easier to understand if one considers the early US-AEP program (1992-95), which USAEP staff refer to as the "trade lead a day" program. However, US-AEP's focus changed in 1995, when it redefined its Goal and Strategic Objective to a "clean revolution", and to "a sustained impact on decision makers..." in Asia. In 1998, USAEP instituted a programming process, which emphasized the preparation of country level strategies, developed in collaboration with AID Missions - and annual work programs focused on US-AEP's Strategic Objective. The combination of these two developments has firmly structured US-AEP in the sustainable development paradigm.

VIII. CONCLUSIONS

1. The "clean revolution" , which currently serves as the goal of the AUS-AEP program, needs to be seen as a revolution – one directed at bringing equivalency to environmental concerns and putting them on a par with economic growth and social benefits requirements in the allocation of USAID development assistance resources.

2. The US-AEP, through its "partnership approach", has been successful in mobilizing U.S. expertise and using it effectively "to address the serious environmental problems in Asia". It has, accordingly, achieved its initial goal.

3. The Team considers the US-AEP to have been cost effective in its operations to date, and a model for USAID advancement/achievement of its environmental goals. This judgement reflects the US-AEP's relatively low program cost ($15 to $17million per annum). It also reflects recognition of the emphasis being given by US-AEP to maintaining sustained contact with the key people, institutions, and forces that are the drivers behind efforts to bring about environmental improvements, including in particular the leaders and residents of the communities involved.

4. The current US-AEP strategy of directing program resources to activities that are aimed at bringing about better public policy and environmental regulation; improved urban environmental management; improved industrial environmental performance; increased transfers of environmental technology, expertise and practices, through trade and investment; greater involvement of civil society in environmental matters; and improvement in energy efficiency—seems well suited to both the environmental needs of the countries in which it is operating and to its own capabilities. Team field interviews indicated that to community residents and leaders in Asian countries, the most important environmental improvements are those that relate to clean water, clean air, energy efficiency, and solid waste removal. Efforts to bring about the greater involvement of civil society in environmental matters would likely be more effective, however, if such efforts were dealt with as an integral component in the five other areas of program focus, and not identified and managed as a separate area of focus.

5. USAID has invested $170 million over 10 years in developing the US-AEP program into an effective, recognized, and respected part of the development/environmental paradigm in Asia. It would be a mistake to lose the continuing potential benefits to be derived from this program.

6. The mantra that all AID activities must be undertaken as part of the Mission is unfortunately accepted as dogma and discourages innovative thinking in the development of AID program management and ideas. The fact that a program such as the US-AEP or the OFDA operates alongside a Mission is not in itself a management problem. The US-AEP has proven itself to be a valuable partner for USAID Missions throughout Asia.

IX. RECOMMENDATIONS AS TO FUTURE US-AEP OPERATIONS

1. The Evaluation Team recommends that the US-AEP program remain within the management structure of the ANE Regional Bureau for the foreseeable future. Team interviews confirmed that regional identity and responsiveness to differences across regions have been important to the program's success. In so doing, the ANE Bureau should modify the program's organizational structure and mode of operation, as needed to convert it into a field-driven operation. Further, US-AEP prepared a Strategic Plan in May 1995, covering the period, 1995-2000. The Strategic Plan has not as yet been updated, whereas US-AEP objectives have

changed since the 1995 Plan was developed. The preparation of an updated Strategic Plan is certainly in order.

2. The Team recommends that ANE establish one or more regional US-AEP offices in Asia to provide direct supervision of contract and local staff and to improve the coordination and liaison with the USAID Missions and international organizations that are operating in the region.

3. Consideration should be given to transferring the ETNA trade leads activity to the EGAT Bureau. The US-AEP should continue its efforts to engage the five ADCs in environmental improvement activities in the LDCs. The ANE Bureau should also ensure that the US-AEP program will continue to be given the high-level of support by USAID that is essential, if it is to continue to achieve its environmental protection goals and objectives.

4. The Evaluation Team believes that it is essential to the continued success of the US-AEP program that EPA technical staff become more active in providing information and advice to US-AEP and beneficiary countries, particularly regarding appropriate environmental technologies, and that it be more forthcoming in providing technical support services. The MOU between the US-AEP and the EPA should be updated accordingly. The Team heard a number of complimentary remarks, during its field interviews, regarding the quality of the technical services provided by EPA field staff; however, these remarks were coupled with comments to the effect that EPA field operations were not very well funded, limiting their availability.

5. The US-AEP Executive Director should strive to keep a narrow focus on the scope of program activities. As suggested earlier, bringing about the greater involvement of civil society in environmental matters should be dealt with as an integral component in the five other areas of program focus, and should not be identified and managed separately. During its field visits, the Evaluation Team noted that there is considerable scope in client countries for the near-term expansion of US-AEP activities relating to the bringing about of better public policy and environmental regulations; and to the improvement of urban environmental management in Asia's rapidly expanding urban centers. In this regard, there appears to be considerable concern among Asia's urban planners that the environmental problems of the high levels of water and air pollution emanating from small and medium-scale industries in urban areas are not being adequately addressed by organizations such as the US-AEP. Steps should be taken to ensure that these problems are addressed.

X. OTHER ITEMS AND ISSUES TO BE CONSIDERED

1. A PROPOSED NEW SOURCE OF FINANCING

A major constraint to the implementation of many environmental initiatives, whether in the industrial sector or the urban sector, is lack of long-term financing. AEP should consider working with USAID's Development Credit Authority (DCA) to finance small demonstration environmental projects, in some cases utilizing appropriate U.S. technology. The DCA would bring private sector

financing and risk analysis into the Asia environmental program and enable US-AEP to further demonstrate new approaches to economic development and its environmental consequences.

2. THE PROSPECT OF PRIVATIZING THE US-AEP

The original concept of US-AEP included the prospect of privatizing it at some future time. While privatization does not appear to be a realistic option, USAID may want to explore the idea of creating a non-profit environmental foundation. Specifically, a foundation along the lines of the private investment banks created with U.S. Government seed capital in, among other places, Hungary, Rumania and Russia. Potential non-governmental donors could include major international corporations now working with the US-AEP, environmental organizations, development-oriented foundations, environmental foundations etc.

3. REPLICATION OF THE US-AEP'S "PARTNERSHIP APPROACH"

US-AEP has already been used by USAID's E&E Bureau and by the European Union as a model for developing partnership-focused programs in the environmental sector. The US-AEP model could also be considered as the model for similar partnership programs in other substantive areas, where USAID has an interest, such as health and agriculture. A critical concept, however, is that any such US-AEP-type programs should function as complementary to, and in coordination with, ongoing USAID Mission programs in these sectors.

4. COST RECOVERY

A major success of the US-AEP over the past 10 years has been its record of assisting U.S. companies in selling over $1.4 billion in U.S. environmental goods and services. This effort has been made by US-AEP, at no cost to the U.S companies involved in the transactions. USAID should consider instituting a cost recovery policy, which would assess a fee for US-AEP services, but only on successful sales and on a reimbursable basis. A 1% reimbursable success fee on $1.4 billion in sales would net $14,000,000.

ANNEXES:

EXHIBITS:

ANNEX A

List of People Interviewed

Taiwan

Yeong-Ren Chen, Dr. PH
Secretary General
Environmental Protection Administration
Government of the Republic of China

Jerry H. Huang
Deputy Director
Sustainable Development Division
Industrial Development Bureau
Ministry of Economic Affairs

William L. Marshak
Deputy Section Chief
American Institute in Taiwan
Commercial Section

Huan-Cheng Wen
Section Chief
Pollution Control Division
Environmental Protection Department
Taiwan Power Company

Paul C.P. Lee
Division Chief
Pollution Control Division
Environmental Protection Department
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National Taiwan University of Science and Technology

Hal Falls
Director
State of Arizona
Asian-Pacific Trade Office

Grace Tao
American Institute in Taiwan
Commercial Section

Singapore

Tan Kim Suan
Corporate Communications Manager
Environmental Technology Institute

Indonesia

Ahmad Safrudin
Chief Executive
Walhi Jakarta

Restiti
Program Officer Campaign
Clean Air Project
Swisscontact

Jim Woodcock
Urban Infrastructure Adviser
U.S.-Asia Environmental Partnership
USAID

T. Christopher Milligan
Director
Decentralized Local Government Office/Indonesia &
Regional Urban Development Office/S.E. Asia
USAID

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Senior Sustainable Energy Advisor
USAID
Energy Governance Team

Ir. Rudy Yuwono, MSc.
Deputy Director for Public Communications
Ikatan Ahli Teknik Penyehatan Dan Teknik Lingkungan Indonesia

Prof. Dr. Benny Chatib, MSc.
Yayasan Pendidikan
Tirta Dharma
(Education and Training Foundation)

Foort Bustraan
Institutional and Technical Adviser
PERPAMSI
Indonesian Water Supply Association

Ir. H. Kumala Siregar
President
PERPAMSI
Indonesian Water Supply Association

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Embassy of the United States of America
U.S. Department of Commerce

Aboejoewono Aboeprajitno
Senior Advisor to the Minister
Global Environment Affairs
Ministry of Environment
Republic of Indonesia

Ridwan D. Tamin, M.S. (R)
Head, Mobile Source Division
Environmental Impact Management Agency
Bapedal

Ir. Dudy Christian
Director
ADIPROTEK Environdunia

Drs. Aditya Karma
President Director
ADIPROTEK Environdunia

FJ. Gunawan
Technical Development Manager
PT. Adiprotek Environdunia

Suzanne R. Billharz
Director for Program Coordination and Policy
US-AEP Program

Thailand

Stacy E. Bonnaffons
Manager, Asia Business Development
U.S. Trade and Development Agency

P. Illangovan
Senior Environmental Specialist
Environment and Social Development Unit
The World Bank

Satit Sanongphan
Deputy Director
US-AEP
American Embassy Bangkok

Arthit Vechakij
Managing Director
Excellent Energy International Company Limited

Kitti Kumpeera
Director
Environmental Management Division
Kenan Institute Asia

Kitti Kumpeera
Director
US-AEP Urban Infrastructure Program
Kenan Institute Asia

Paul Wedel
Executive Director
Kenan Institute Asia

Professor Dr. Montri Chulavatnatol
President
Kenan Institute Asia

Anchalee Chavanich
Governor
Industrial Estate Authority of Thailand

Darryl Norman Johnson
Ambassador of the United States of America

Ted Osius
Regional Environmental Affairs Officer
Embassy of the United States of America

Samarn Thangtongtawi, Ph.D.
Chief Engineer
Industrial Estats Authority of Thailand

Ngamwalaya Tasneeyanond
Assistant to the Senator, Tak Province

Paul B. Violette
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US-AEP

Panat Tasneeyanond
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Environmental Research Institute

Karen L. Ware
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Embassy of the United States of America

Woothisarn Tanchai
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Faculty of School Administration
Thammasat University

Dr. Bhichit Rattakul
Director
Anti Air Pollution & Environmental Protection Foundation

Dr. Hansa Sanguannoi
Executive Director
Anti Air Pollution & Environmental Protection Foundation

Saurapong Phutanapiboon
Mayor
Rayong Municipality

The Philippines

Conchita C. Silva
Program Manager, Asia
Technical Support & Services Contract
US-AEP Program
USAID

Dennis C. Zvinakis
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United States-Asia Environmental Partnership
USAID

Roselita "Bo-Peep" C. Paloma
Committee Secretary
Committee on Ecology
Republic of The Philippines
House of Representatives

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Tetra Tech EM Inc.

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Finance and Infrastructure Division
Regional and Sustainable Development Department
Asian Development Bank

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Agriculture, Natural Resources &
Social Sectors Division
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Allen Williams
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Chantale Yok-Min Wong
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Asian Development Bank

Cornie Huizenga
Secretariat
Clean Air Initiative for Asian Citiex
Asian Development Bank

Jakhanit Kananurak
Program Associate
Alliance to SAVE ENERGY

Patricia K. Buckles
Mission Director
USAID

Jerry P. Bisson
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Office of Environmental Management
USAID

Laurie de Freese
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Stewart J. Ballard
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League of Cities of the Philippines

Glyynda Bathan
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Miscellaneous

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USAID

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US-AEP Program
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Senior Advisor
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Larry C. Lai
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Exchange Program for Sustainable Growth

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John C. Speicher
Administrative and Financial Manager
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International City/County Management Association

Sarah J. Heidema
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International Development Programs
National Association of State Development Agencies

Amanda E. Morris
International Trade Specialist
National Association of State Development Agencies

Albert C. Harberson
Director and Assistant
General Counsel
Trends Research and Response Group
The Council of State Governments

Chris Whatley
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Magdalena N. Mook
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U.S.-Asia Environmental Partnership
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EXHIBIT 1

US-AEP RESULTS FRAMEWORK

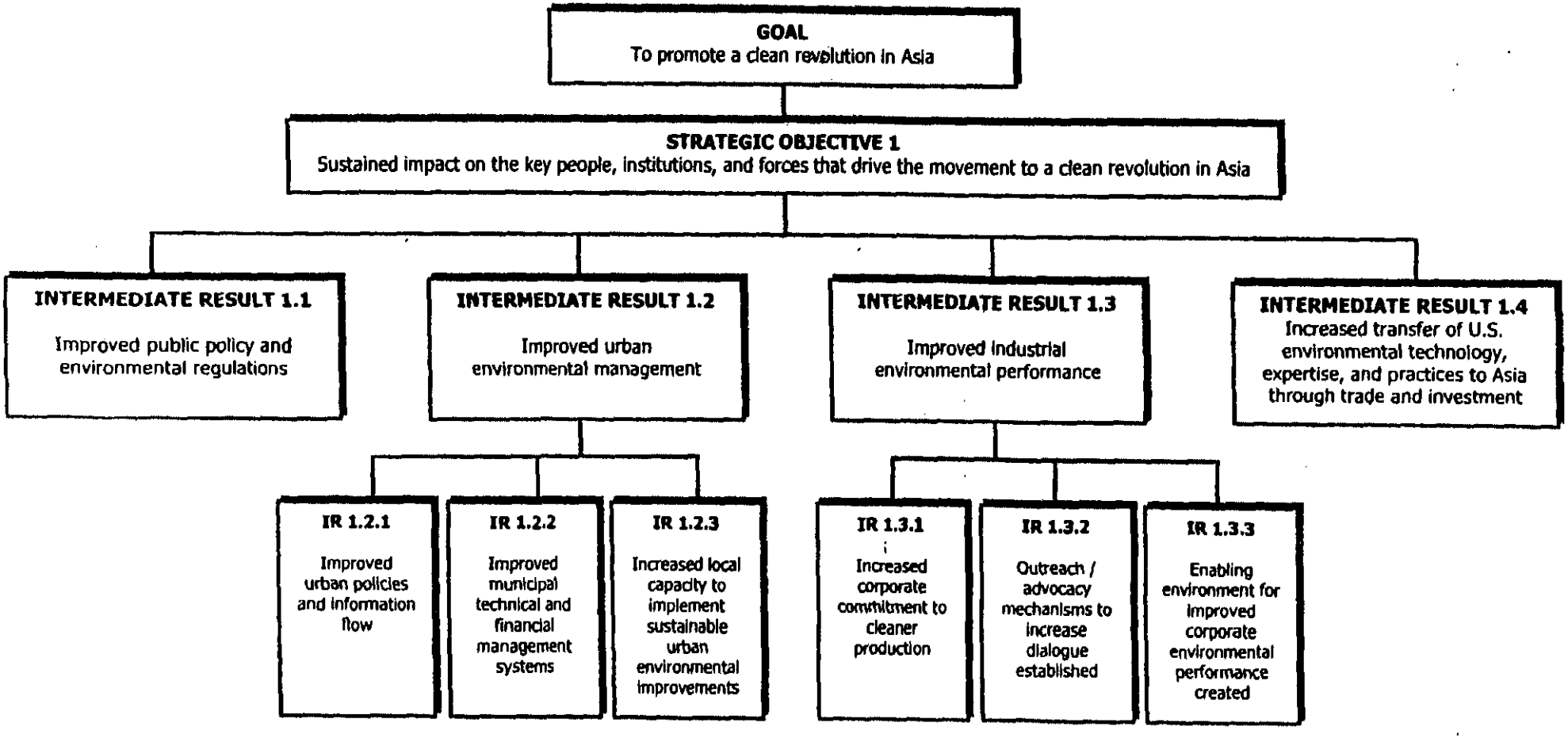

EXHIBIT 2

US-AEP Thailand Program Strategy Framework

Program Area	Program Drivers	Key Partners & Resources	Key Objectives	Approach	Activities
Public Policy					
IR 1.1: *Improved public policy and environmental regulations*	Legal Constitution Decentralization Act Official Information Act Admin. Procedure Act Public Hearing Act (draft) Institutional New environment ministry World Bank EIDP Project Public Pressure Infrastructure project Public health problems Pollution discharge events	1. MoSTE 2. EPA MOU 3. MDE 4. World Bank 5. Admin. Court 6. ELCT 7. EPAF	1. Support in-country policy, legal, regulatory and institutional reform initiatives and plans 2. Build agency, NGO and community capacity to support implementation of reform initiatives	1. Work with MoSTE, World Bank and other key partners to support and promote key in-country reform initiatives 2. Work with legal community to support implementation of constitutional reforms 3. Link core EPA and MDE capabilities to support reform agenda 4. Establish in-country and regional policy network 5. Integrate workshops, training, and study tours to build capacity	ADS I: Regulatory Dialogue ▸ Environmental Institutions Reform Project ▸ Administrative Court ▸ Council of State ▸ Environment Fund ADS2: NGO Grants Program ▸ Federation of Thai Industries ▸ Environmental Law Institute ▸ Foundation for Environment and Anti-Air Pollution ▸ Council of State ADS 3: Local Authorities ADS 4: Pollutant Release and Transfer Registry
Urban					
IR 1.2: *Improved urban environmental management* **IR 1.2.1:** *Improved urban policies & information flow* **IR 1.2.2:** *Improved technical & financial management systems* **IR 1.2.3.:** *Increased local capacity to implement sustainable environmental improvements*	Legal Constitution Decentralization Act Infrastructure Development ADB Solid Waste Program Prov. Environmental Action Plans Failed wastewater projects Public Pressure Demand for urban services Public health problems Institutional Privatization Master Plan	1. Kenan 2. ICMA 3. Bangkok, Rayong, Chiang Mai 4. Portland, Denver 5. MoSTE 6. TEI 7. MLT 8. Thai Local Self-Government Association 9. Environment & Anti-Air Pollution Found 10. Local Government Development Inst. 11. Chulalongkorn University	1. Work with cities, NGOs, associations, and other partners to facilitate adoption of improved urban policies, systems, practices and plans 2. Establish and pilot test demonstration activities for improved urban policies, systems, practices and plans 3. Disseminate and replicate demonstration models	1. Work with Kenan to identify, structure and coordinate U.S.-Thai partnerships that aim to transfer policies, systems, practices and plans 2. Work with U.S. and Thai NGOs, associations and agencies to support development and implementation of pilot activities, e.g., ICMA, EPA, TEI, Chulalongkorn 3. Replicate through MLT, TEI, MoSTE and other associations and agencies	ADS 1: Green Fleets ADS 2: Resource Cities/Livable Cities ADS 3: Chiang Mai Air Quality ADS 4: Municipal Manager Certification ADS 5: Urban Environmental Best Practices ADS 6: Solid Waste ADS 7: Municipal Energy Conservation ADS 8: Urban Regional

Program Area	Program Drivers	Key Partners & Resources	Key Objectives	Approach	Activities
Industry					
IR 1.3: *Improved industrial environmental performance* **IR 1.3.1:** *Increased corporate commitment to cleaner production* **IR 1.3.2:** *Outreach and advocacy mechanism to increase dialogue established* *IR: 1.3.3: Enabling environment for improved corporate environmental performance created*	Competitiveness Government trade/industry policy Recognition ISO 14000 Best Practices Government SME Policy Compliance New environment ministry Constitution Revising NEQA	ERIC UNC Ford Motor EPA ASE FTI DIW IEAT	1. Work with key U.S. and Thai companies to promote cleaner production, clean technology, supply chain relationships, reporting, etc. 2. Partner with key Thai and international associations to disseminate information on best practices 3. Work with organizations and agencies to influence enabling environment for promoting clean technology	1. Cultivate relationships and networks through key in-county partners to respond to specific opportunities (e.g., ERIC, FTI) 2. Develop targeted activities that integrate network development, capacity building, policy development and technology transfer opportunities through key U.S. partners (e.g., ASE and EPA).	ADS 1: Energy Efficiency (ASE) ADS 2: Competitiveness and Sustainable Enterprise ADS 3: Eco-estates (EPA) ADS 4: Industrial Assessment
Trade & Investment					
IR 1.4: *Increased transfer of U.S. environmental technology, expertise and practices to Asia through trade and investment*	New Laws and Regulations PCD, DIW, LTA, BMA Revising NEQA Improved Enforcement MoSTE reorganization PCD, DIW, LTA, BMA Competitiveness Government trade/ industry policy Infrastructure Hazardous waste	DOC Tools Aquatech A&WMA, WEF, etc.	1. Provide targeted support to selected U.S. small and medium sized companies with a high potential for success in key market areas to maximize transactions 2. Establish relationships with Thai companies, agencies and organizations to enhance trade and investment opportunities 3. Ensure US-AEP policy, urban and industry program maximize trade and investment potential	1. Provide core Commercial Service support a fee-based services to U.S. exporters applying market research information and other intelligence. 2. Apply US-AEP transaction-based tools to companies pursuing specific market opportunities (e.g., EEP, NASDA, trade shows. etc.) 3. Support development of local markets and improve market intelligence by building networks and influencing market drivers through policy, industry and urban programs	ADS 1: Thai participation in US Trade Shows (Weftec, Waste Expo and AWMA) ADS 2: American Trade events in Thailand (Oregon, Ohio, Illinois, combined event) ADS 3: Project to identify opportunities and companies ADS 4: Efforts to match US companies

EXHIBIT 3

TABLE OF CONTENTS

Introduction to US-AEP Program

Created in 1992 on President Bush's initiative, the United States-Asia Environmental Partnership (US-AEP) is a public-private and interagency partnership, led by the United States Agency for International Development (USAID). Working through a network of public and private partners in Asia and the United States, US-AEP promotes the adoption of clean and efficient technologies, policies and practices by Asian industries, cities and governing entities and encourages a "clean revolution" in Asia.

US-AEP works to support the positive relationship between economic growth and environmental protection by integrating sustainable development, the environment and trade for the benefit of Asia and the United States, while building sustainable relationships that will extend into the future and throughout the region.

US-AEP Regional Success Stories

ISO 14001 Accreditation Systems Established in Nine Countries

Countries: Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand

Effective environmental management is a key element in every country's strategy for realizing sustainable development and global competitiveness. The international community, through the ISO 14000 series of standards, has provided a universally-recognized Environmental Management Systems (EMS) platform and certification system designed to differentiate and certify industrial environmental performance. Until recently, Asian countries were not in the dialogue or able to meet the standards. In 1997, US-AEP began a series of interventions that resulted in the establishment and recognition of national ISO accreditation bodies in nine of the 11 US-AEP targeted countries. US-AEP's work was responsible for building the national capacity and necessary infrastructure to establish a prosperous and national means of certification and verification for EMS, rather than for those countries to rely on expensive, external service providers. As a result, all US-AEP target countries are engaged in the international rule setting of the ISO 14000 series, participating in the Developing Country Committee and/or other technical subcommittees, and in turn can provide their own industries and professionals with internationally recognized certifications. Additionally, through US-AEP interventions, the US and Asian Accreditation Boards have established lasting links to share experiences and best practices. Over 29 organizations were reached and nearly 100 people from 11 countries trained. In turn, there is a multiplier effect as these 100 individuals conduct multiple ISO 14001 EMS audits in the 11 countries. Out of the total cost of $300,000 for activities leading towards achieving internationally recognized bodies, US-AEP's contribution was $129,000.

Multi-Country Livestock Pollution Addressed Through Regional Center

Country: Taiwan, for Regional Use and Participation

The management of livestock wastes is a highly chronicled environmental, agricultural, public health and sensitive political issue worldwide. In 1996, during an US-AEP needs assessment, livestock wastes were ranked as a top priority in the agribusiness sector in Asia. As a result, US-AEP led and organized a public-private partnership of American equipment manufacturers and five U.S. universities to design an innovative treatment system in concert with the Asians that uses the latest American equipment and technology. The National Pingtung University of Science and Technology in Taiwan agreed to be the venue for the newly established "Environmental Center for Livestock Waste Management." The American equipment manufacturers contributed an estimated $500,000 of their technologies and services while the US universities contributed about $60,000 of engineering expertise. Impressively, Taiwan has invested nearly $2,000,000 for construction and operation of this Center as a sustained regional showcase of American leadership and technologies. Over the past two years, the Center has conducted training sessions on the American-sourced equipment for experts ranging from planners, regulators, designers, builders, and operators of livestock waste management systems from developing countries such as Vietnam, Malaysia, Thailand and Philippines.

More importantly, this innovative system has just completed technical performance testing by the five American universities. The results have exceeded expectations. For example, 95% of organics are removed which is comparable to a tertiary water treatment facility. In contrast, the traditional livestock "lagoon" method only removes an average of about 50% or up to 75% removal when the lagoons are spread over a large surface area - unfortunately, Asia does not have such large acreages as in the American mid-west. This system has a small "footprint" and occupies minimal space, it is more reliable and enclosed so there are no odors and public health issues of raw effluents overflowing during monsoons or hurricanes. Plus there is about 85% nitrogen removal in the effluent to minimize algal blooms and fish kills in rivers and lakes. The results of this system and its economic costs will be presented at an international livestock waste symposium in Penang, Malaysia from May 19-23, 2002. The US land grant universities predict that this innovative system and technology shall change the landscape of livestock waste management not only in the US and Asia, but worldwide, in the next decade.

Critical Technical Inputs Mitigate Pollution in Rapidly Growing Asian Cities - The International Resource Cities Program (ICRP)

Countries: Philippines, Thailand, Vietnam

Integrated city planning in developing countries is often non-existent or an after thought that inhibit their ability to sustain their growth in an environmentally safe, sustainable way. City officials desperately need access to the proper resources so that they can better plan, manage and implement sustainable solutions to environmental problems. US-AEP promoted a city partner planning model to help develop the International Resource Cities Program (ICRP), a program that links Asian cities with counterparts in the U.S. to help them

develop sustainable, environmentally sound city management plans. US-AEP supported the development of three resource cities partnerships in Cebu, the Philippines; Rayong, Thailand; and Haiphong, Vietnam.

Struggling to address a mounting municipal solid waste problem, the city of Cebu, in the Philippines, has partnered with the city of Fort Collins and Larimer County, Colorado to design a framework for a 10-year comprehensive solid waste management plan, reduce the volume of waste entering the landfill, and initiate two pilot projects for recycling and composting. The city of Rayong, in Thailand, partnered with Portland, Oregon, a model city for urban planning, growth management and environmental protection to strengthen municipal financial management and citizen involvement in city processes. As a result, Rayong created a citizen budget review committee modeled after its Portland counterpart. In an effort to manage growth, develop its tourism sector and provide adequate urban services, the city of Haiphong, Vietnam, has partnered with Seattle, Washington, to develop a comprehensive master plan for the city. In support of this effort, Haiphong has received three months of in-country technical assistance from a Seattle city planner on urban and transportation planning, housing development, industrial development, and eco-tourism.

Under the ICRP, U.S. cities, counties and associations continue to partner with Asian cities to provide technical assistance to improve professional municipal management, support participatory and inclusive governance, enhance economic development, promote sound financial management, and improve the delivery of environmental services. All three cities were strengthened by working with their respective resource city to better plan, manage and implement sustainable solutions to the environmental problems caused by rapid expansion.

US-AEP's efforts have resulted in the development of environmentally sound, sustainable city planning for all three of these cities, positively impacting the lives of nearly 5 million people. In addition, the partnerships established between these cities have served to inspire similar partnerships between the U.S. and multiple rapidly growing Asian cities.

Summit Inspires Commitment and Plans of Action from Asian Officials in 29 Countries

Countries: Regional – participants came from India, Indonesia, Thailand, Vietnam, the Philippines, Bangladesh, Cambodia, China, Japan, Korea, Malaysia, Singapore, Sri Lanka and several Pacific Islands

One of the most pressing issues facing developing Asian countries today is a lack of knowledge on the part of local leadership in terms of achieving sustainable urban development. In response to this, US-AEP co-founded the bi-annual Mayors' Asia-Pacific Environmental Summit (MAPES) and its sister organization, the Asia-Pacific Urban Institute (APUI). MAPES is a unique forum for Asian urban leaders to commit to action to improve their cities, exchange lessons, build relationships and create positive change. APUI is an initiative built on the substantial foundation of partnerships and programs established from MAPES. Its purpose is to integrate MAPES as part of a comprehensive cycle of training, expert advice, partnership development and policy support for governors, mayors and city management executives who make exceptional commitments to action in the fields of poverty alleviation and sustainable development.

Hosted in Honolulu, Hawaii, both the inaugural MAPES Summit in 1999 and the following Summit in 2001 were attended by more than 400 delegates, representing over 100 cities from 29 countries. The Summits highlighted the essential role of political leadership and personal and professional commitment in achieving urban sustainable development. At both Summits, each participating mayor registered "Mayor's Commitments" to undertake specific, concrete activities to implement the Summit's findings in their cities. As a result, 43 Mayors and Governors announced commitments in 1999 and 2001 to undertake environmental improvement activities in their jurisdictions.

APUI's first Executive Seminar focused on Integrated Water Resources Management (IWRM), a participatory planning and implementation process in which stakeholders meet a region's long term needs for ecologic and economic water resources. A select group of 54 city leaders and water managers from the Philippines, Thailand, India, Vietnam, Indonesia, China and Cambodia participated in the 4-day seminar. The event closed with representatives from 27 participating local governments pledging commitments to address water sanitation issues in their cities. The commitments garnered at both the Summits and the Executive Seminar, if fully implemented, will impact over 65 million people living in urban areas in 7 Asian countries.

Helping Children by "Getting the Lead Out" Throughout the Region

Countries: Vietnam, the Philippines, Indonesia

The continued use of leaded gasoline creates both pollution and public health problems for Asian nations. Human exposure to leaded fuel can result in respiratory illnesses, increased infant mortality, and premature deaths among adults as a result of heart attacks or strokes. Statistics also link increased blood levels of lead with anemia and a decreased IQ in children. US-AEP determined that in order to assist Asian countries in improving their air quality, key activities needed to be undertaken in the areas of Policy, Partnership and Public Outreach. Three countries in particular have benefited from US-AEP's efforts: the Philippines, Vietnam and Indonesia.

In 2000 and 2001 in the Philippines, US-AEP helped conduct several workshops on public awareness for clean air using a module from USEPA. US-AEP also offered financial assistance in the form of grants to cover logistical costs not included in government and private sector funds. As a result of these efforts, the Coalition for Clean Fuels was formed. The Coalition is a diverse group of private, NGO and government players to develop a coordinated public awareness raising effort to promote clean air. US-AEP spearheaded a public outreach campaign in Metro Manila that was launched in November 2001 and is now ensuring public acceptance of the elimination of leaded gas. The Coalition for Clean Fuels has been instrumental in developing a detailed campaign plan and strategy, and a plan to develop a wide-reaching, institutionalized certificate course on awareness training.

Vietnam has also seen success in this area. Through US-AEP's support, Vietnam has accelerated its phase out of leaded gasoline from 16 years to six. The country has also begun a public awareness campaign similar to the Philippines' campaign. In Indonesia, the Vehicle Emissions Action Plan was initiated in 2001. The Plan contained several activities and workshops and resulted in the creation of a Jakarta Action Plan, which has already been put into force and is projected to be completed in the rest of Indonesia before the end of 2003.

With US-AEP's help, lead phase out of gasoline in the Philippines, Vietnam and Indonesia was the first step toward improving the air quality in the region. Lead levels in Manila's atmosphere have already decreased. Indonesia has seen the development of new partnerships between all levels of government in Indonesia. The lives of millions of people in these countries have already begun to improve and the continued success of the phase-out programs will undoubtedly result in better health and quality of life for Asian children.

US-AEP's Regulatory and Public Policy Program Successes

Environmental Regulatory Dialogue Sends Asian Polluters a Strong Message

Countries: Regional – Thailand, Philippines, Vietnam, Indonesia

Effective policies and laws can have far-reaching, long-term impacts on the environment, human health and economic growth. The US-AEP Environmental Regulatory Dialogue is a field-based regional public policy initiative that catalyzes meaningful reforms through targeted assistance to senior agency officials, legislators, judges, environmental groups, industry leaders, academics and the media.

US-AEP, EPA and its partners join with Asian agencies and organizations to help them: (1) set policy priorities; (2) establish stakeholder working groups; (3) support formulation of draft laws or policies and initiate partnerships via video-conferences and overseas observational programs; and (4) organize workshops to refine drafts and build consensus. Since 2001, US-AEP has catalyzed over 10 major legal and policy advances in public participation, community involvement, conflict resolution, economic instruments, enforcement, decentralization and institutional reform.

A visit to the U.S. by Thai officials along with follow up workshops contributed to the development of a ground-breaking Public Consultation Law that directly engages the public in environmental decisions. With the support of US-AEP, the Thai Council of State, which drafts legislation, is going even beyond U.S. practice with an internet/mail campaign soliciting public comment on the new law. Through agency to agency exchanges with Thailand, Vietnam's National Environment Agency is incorporating international best practices in its new Environment Fund. Building partnership between Thailand and Vietnam is just one element of US-AEP efforts to assist in launching this new fund, which will provide incentives for environmental investments and enforcement.

Collaboration with the Philippines Lake Laguna Development Authority is leading to an action plan for community based clean up and enforcement through River Councils established by the Authority in 18 of the lake's 24 sub-basins. The work complements new World Bank pilot lending to strengthen the Authority's overall environmental management capabilities.

The Regulatory Dialogue is having real impact. A recent landmark ruling by a judge participating in a US-AEP Forum on the Environment resulted in the closing of an illegal landfill in Thailand, establishing a floor for enforcement and sending a clear message to polluters and regulatory agencies. The judge attributes US-AEP linkages to U.S. and Asian judges as instrumental in helping her make the decision.

Establishing the Greening of Industry Network – Asia (GIN-Asia) Node in Partnership with the Environmental Research Institute of Chulalongkorn University (ERIC)

Catalyzing Sharing of Best Practices via the Asia Pacific Roundtable for Cleaner Production (APRCP) for Asian Countries

Countries: Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam and other Asian countries

Establishing the Greening of Industry Network – Asia (GIN-Asia) node in partnership with the Environmental Research Institute of Chulalongkorn University (ERIC)

The Greening of Industry Network (the Network) was initially formed in 1991 to serve as an international association of professionals from academia, business, NGOs, and government. The Network focuses on issues of industrial development, environment and society and is dedicated to building a sustainable future. US-AEP went into action to ensure that the Network, which had existing centers at Clark University in the U.S. and Twente University in the Netherlands, also had representation in Asia.

Working with the Network, US-AEP identified the Environmental Research Institute of Chulalongkorn University (ERIC) as an Asian center to complement the activities of the Network's two existing centers. US-AEP provided financial and logistical support for the Network's new node (GIN-Asia) that includes representatives from all US-AEP countries. Altogether, the Network now comprises over 1,500 individuals representing academia, business, public interest, labor and government from 50 countries. The Network focuses on research to inform policy making, legislation and industrial strategies through an agenda of linked conferences, publications, communications and research initiatives.

For example, in June 1998, GIN-Asia sponsored a regional workshop to devise practical solutions to incorporate environmental considerations into the region's economic recovery strategies. The workshop received co-sponsorship from Thailand's MoSTE, PCD, DIW, and FTI, as well as the Philippines' EMB, UNEP, and the Asian Productivity Organization. US-AEP's initial financial contribution to the launching of the GIN-Asia node was $75,000 and this was matched by over $120,000 from ERIC. GIN-Asia's real success is in creating a vibrant network where Asian and other international champions of industrial environmental management and sustainable development can freely exchange ideas and practices and can integrate and incorporate these concepts into the academic curriculum for future generations.

Catalyzing Sharing of Best Practices via the Asia Pacific Roundtable for Cleaner Production (APRCP) for Asian Countries

Cleaner Production (CP) was introduced by the UNEP in 1989 as a new and innovative approach to resource conservation and environmental management. Implementing CP practices at the local firm level contributes to sustainable development and global competitiveness. However, Asian countries were not engaged in the CP-dialogue because most of the sharing of CP solutions occurred in the West. As a result, the techniques discussed were not necessarily applicable in the Asian context and Asian CP successes were not widely

disseminated. Recognizing this gap, US-AEP founded APRCP, as a tool to promote CP concepts and enable the exchange of CP best practices and lessons learned in Asia.

The first APRCP held in Thailand in 1997 brought together over 250 participants from 26 countries, laying the groundwork for APRCP to evolve into an ongoing regional entity and amplifying the region's awareness and commitment toward CP. APRCP's official mission is to foster dialogue among industry, government, academia, and non-government organizations in the region to address pollution problems and solutions. Roundtable goals include promoting information exchange among its members through a website, newsletters, e-mail list servers, technical journals, special publications, conferences, and symposia. US-AEP has actively supported APRCP by providing strategic direction and guidance on the Board of Advisors. US-AEP provided financial support of $45,000 for fiscal years 2000-2002 and this has been leveraged with funding from ADB, Thailand's Pollution Control Department, and UNEP, among others. In addition, US-AEP is providing $20,000 of the $120,000 required for the upcoming fourth APRCP, in Yogyakarta, Indonesia, scheduled in October, 2002. US-AEP has supported APRCP by providing technical expertise, writing case studies, and conducting outreach and training – both during the Roundtable conferences and the myriad of interim activities. Most importantly, US-AEP has used APRCP as a multiplier to engage Asian stakeholders from all eleven of US-AEP's countries in the creation, implementation and dissemination of CP practices throughout Asia.

Energy Efficiency Industry Partnership Program Strengthens Key Associations in Thailand

Country: Thailand

Two new trade associations of energy efficiency companies in Thailand were created with assistance from USAEP in FY 2000 and 2001. One, the Energy Efficiency Development Alliance (EEDA), consists of large energy efficiency firms while the other, the Energy Conservation Entrepreneurs Association (ECEA), consists mainly of individual professionals and smaller firms. These associations provide a recognized platform from which energy efficiency businesses can work with the government on public policy and communicate the advantages of energy efficiency to the public.

The goal of the USAEP project is for them to become self-sustaining, influential forces in Thailand advocating energy efficiency over the long term. This goal is taking shape as the associations become valued by the Government of Thailand as sources of expertise and advice. One of the most effective ways firms can increase the adoption of their energy efficiency products and services is to help the government make its policies designed for this purpose more effective. This is especially true in Thailand, where the government has a myriad of well-intentioned policies on efficiency that have not been translated well into results.

EEDA has been actively engaging the Dept. of Energy Development and Promotion (DEDP) in dialogue about how DEDP can improve its implementation of energy efficiency policies. The members chose a set of policy issues it wanted to address and they are now working on the highest priority issue, helping the government to operationalize its revolving loan fund for energy efficiency projects. In May 2002, DEDP officers and representatives of EEDA and ECEA went on a tour to the U.S. to learn about successful U.S. financing mechanisms for energy efficiency, and more about how energy service companies (ESCOs) work in the U.S. In addition to public policy, the project also builds awareness in consumers of

the benefits of energy efficiency. Educational seminars are held for energy users with presenters from firms that supply energy efficiency equipment and expertise. By bringing together those with the demand for efficiency with those who supply it, the audience becomes aware of both money saving opportunities and the firms that can provide them, as well as raising the visibility of the associations. Targeted sectors so far have been hospitals, hotels, and factories (stressing medium-sized facilities).

Urban Success Stories

India Urban Programs Result in Energy Efficiency - Saving Millions While City Manager's Associations Gain Strength and Influence

Country: India

"Watergy:" Municipal Energy Efficiency in Pune, India

In Indian cities, providing water consumes about 60% of a typical municipal budget, while street lighting accounts for another 10 to 15%. The potential for energy savings from these two services is enormous, freeing up much needed capital for other services provided by the city.

Partnering with USAEP, the Alliance to Save Energy worked with the Pune Municipal Corporation (PMC) to help them develop strategies to reduce energy consumption while improving the efficiency of their operation. As a result, PMC has established an energy management team trained by the project, adopted a comprehensive metering and monitoring system, and begun implementing recommendations to improve energy efficiency.

The Alliance developed an automated energy monitoring protocol for the team to collect electricity and water consumption data, including a database format and an analysis protocol. Using these tools, EMC completed the first stage of data collection and analysis for Pune's Parvati Water Works, which accounts for the bulk of the city's total water intake. The Alliance also provided EMC with data collection and database formats for street lighting, for which data collection is in process.

To date, the work of the Alliance has saved the municipality more than 300,000 kWh of electricity worth 1.5 million rupees. The Alliance has also improved its metering and monitoring practices and is reconciling its consumption data with that of the state-run utility, Maharashtra State Electricity Board (MSEB). As a result of this management improvement, it was found that the utility overcharged Pune 6.5 million rupees, an addition financial boon of about $150,000 for the municipal budget.

City Manager's Associations Gain Momentum

Local governments throughout Asia are struggling with the added responsibilities that have come with decentralization and, in some places, are in danger of losing the hard-fought authority and rights that have been granted to them. So, while significant work is required to advance decentralization policies, local governments are in great need of assistance to improve their capacity and level of professional management. US-AEP recognized that local government associations play a key role in that effort.

In three Asian countries, US-AEP is leading the effort to improve the capacity of local government associations to provide increased assistance to their membership. In Thailand and the Philippines, US-AEP is working with national-level local government associations. In India, US-AEP is assisting an existing provincial local government association in Gujarat and is leading the effort to form new associations in 4 other states (Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra). These associations are now improving their capacity to create and disseminate new ideas, best practices and performance benchmarks to local governments.

US-AEP is not stopping at country-based activities. In an effort to create a Professional Management Strategy for Associations, US-AEP and the International City/County Management Association (ICMA), are reviewing and documenting the current practices of local government associations in Asia. In 2002, US-AEP helped strengthen 66 NGOs, associations and networks organized around urban environmental issues. US-AEP also supported a number of professional environmental associations, such as the Solid Waste Association of the Philippines and the Indonesia Association of Sanitary Engineers. The associations being strengthened in India, largely due to US-AEP assistance, have a membership base of over 1,000 urban local bodies. Millions of people will benefit as these associations continue to gain the knowledge, expertise and strength necessary to guide local governments in the direction of environmentally sound and sustainable growth.

Important Water Programs in Indonesia Change Lives: "WET" Delivers Clean Water to Half a Million People While "WILD" Brings Water Education to Women in Indonesia

Country: Indonesia

Water Efficiency Team (WET) Delivers Clean Water to Half a Million People

Increased costs during the 1997 Asian financial crisis forced many of Indonesia's 300 water enterprises to distribute untreated water through their mains instead of shutting off the supply of clean water completely. US-AEP designed the Water Efficiency Team (WET) as part of the 1998 Rapid Response Plan to target Indonesia's weakest and most ailing water enterprises and find ways for them to keep the clean water flowing.

The WET recommendations were aimed at helping water enterprises achieve self-sufficiency, access funds for recommended improvements, and get local government approval of tariff increase linked to service improvements. WET visited and audited 55 out of Indonesia's 300 water enterprises. The WET project is estimated to have helped over 50 of these enterprises reduce costs and improve revenues by making recommendations on the financial, managerial and technical aspects of the operation and maintenance of the water facility.

As a result of WET's efforts, local government saved $10 million in subsidies to failing water enterprises. Implementation of WET's recommendations allowed water enterprises to successfully avert interruption of service to urban poor, thereby enhancing public health and economic activity. In turn, the recommendations created new knowledge that any water enterprise, given an adequate customer base and dedication to serving

customers, can achieve full cost recovery. Best of all, a total of 590,000 people enjoyed piped clean water, thanks to US-AEP's quick response to a very serious crisis.

Women's Institutions for Local Development (WILD) Brings Water Education to Women in Indonesia

Impoverished Asian women are usually responsible for all household activities, including water collection and usage. Unfortunately, they are the least likely to be educated on the benefits of using clean water for drinking, washing and cooking. US-AEP recognized this cultural gap and participated in the creation of the Women's Institutions for Local Development (WILD) project.

WILD has engaged local women's groups in Indonesia to strengthen the bond between municipal water enterprises and consumers, ultimately leading to the provision of better and more responsive public services to the poor. Through field visits to selected water enterprises, a team of female community organization specialists and trainers established a procedure to identify, contact, and motivate more than 100 local women's groups to register formal Water Conservation Forums associated with local water enterprises. Bridging the gap between the community and water enterprises, the forum members receive training and work on a voluntary basis to cooperate in community water-related education activities and provide feedback from the community.

This project inspired the participation of more than 100 volunteer local women's groups, including moderate Muslim groups, in the provision of piped water, through seven water forums. Under the follow-up initiative, WILLOWS (Women's Institutions for Local Leveraging of Water Supply), 30 more forums will be established. This work will eventually culminate in a network of more than 500 provincial women's groups. As a result, thousands of Indonesian families will benefit as the women in their cities and villages are educated on safe, efficient water usage.

Maryland Forges a Clean Air Partnership with the City of Chiang Mai with Potential for Replication in other Thai Cities

Country: Thailand

Looking to improve air quality impacting for the more than 1.5 million people in Thailand's second largest city, Chiang Mai, officials turned to US-AEP to help them understand the breadth of its pollution problems and to search for solutions. US-AEP used its partnership with the Council of State Governments (CSG) to assemble the right expertise to solve Chiang Mai's air quality problems. In September 2001, through the CSG program, US-AEP brought together Chiang Mai and the Thai Pollution Control Department (PCD) with counterparts from the Maryland Department of Environment (MDE), the U.S. Environmental Protection Agency, the U.S. Department of Health and Human Services, and the U.S. Environmental Training Institute.

The American team designed and carried out nine workshops to develop an action plan for improving and monitoring air quality throughout the city. The emissions inventory created by the City of Chiang Mai was the critical first step to identifying air pollution sources and developing improvements. The emissions inventory led to a public awareness campaign on the need for improved air quality and encouraged citizen

participation in reducing air pollution levels. Chiang Mai now has a strategic plan in place for long-term air quality improvements.

Maryland Department of Environment officials have also worked with the Thai Pollution Control Department to increase the national government's capacity to enforce regulations. Maryland and Thailand's working partnership, started in Chiang Mai through US-AEP's small investment of $173,000, is a model for air quality improvements in other Thai cities.

US-AEP's Industry Program Success Stories

TCAPP Generates Joint Projects to Reduce Greenhouse Gas Emissions in Korea

Country: Korea

The Technology Cooperation Agreement Pilot Project (TCAPP) was launched by the U.S. Government to test an approach for transferring technologies that mitigate global climate change from the U.S. to developing countries. It is an interagency effort involving USAID, the National Renewable Energy Lab (NREL) and the Environmental Protection Agency (EPA).

In Korea, TCAPP focuses on two areas: energy efficiency and the capture and use of methane from municipal landfills. The project has been tremendously successful in generating joint U.S.-Korean projects that reduce greenhouse gas emissions, and has leveraged direct contributions to the project that dwarf those by USAEP. In FY 2000, for example, an investment by USAEP of under $60,000 generated almost $408,000 in direct contributions to the project, and in FY 2001 $45,000 in USAEP funding leveraged over $200,000 in direct contributions.

In the area of energy efficiency, as a result of the project, a U.S. energy service company (ESCO) called Sempra did a detailed analysis of the largest auto manufacturing plant in the world, the Hyundai Ulsan facility, and made a set of recommendations to increase efficiency. In order to build capacity for this type of audit in Korea, this work was done in conjunction with a Korean ESCO and the Korean Energy Management Corp. (KEMCO). Although Sempra's corporate headquarters decided to withdraw from Asia altogether, NREL found another ESCO, Honeywell Korea, to implement multi-million dollar energy efficiency improvements on the Hyundai plant. NREL also brokered a relationship between a large U.S. energy efficiency company, Trane, and a Korean ESCO, who are collaborating on two projects as a result. For the landfill methane component, TCAPP engaged the expertise of EPA's Landfill Methane Outreach Program (LMOP). Working with LMOP, the project brokered two partnerships of U.S. and Korean companies to do methane recovery projects in the cities of Taegu and Ulsan. Another site in Cheong-Ju is being studied by the TCAPP team.

Public Health Hazard Abatement Through Improved Waste Management

Country: India

When a large population is faced with serious economic and infrastructure deficiencies, biomedical waste poses serious public health risks causing increases in infectious and communicable diseases including HIV and Hepatitis B and C. In parts of India, this is a life threatening issue. US-AEP has been working to raise awareness about this issue and over the last 5 years, through multiple exchange and training programs, Indian public and private decision-makers have begun to focus more attention and resources biomedical waste problems. Mumbai hospitals have been able to reduce the 25 tons of medical waste generated per day by improved management practices. Through improved technology and handling techniques introduced by US-AEP West Bengal has reduced the weekly release of over 2 tons of untreated biomedical waste into unsecured landfills, thanks to US-AEP's trade lead system. These efforts have greatly improved the lives of millions in surrounding communities.

US-AEP has brought attention and technical assistance to this problem for several years. In February 1999, US-AEP attracted over 500 attendees and extensive press coverage on the radio, television and print by sponsoring the First National Conference on Bio-Medical Waste Management in Baroda; and the Southern Regional Bio-Medical Waste Management Workshop in Chennai, Tamil Nadu, after startling new regulations that imposed criminal sanctions on hospital officials not following proper waste management techniques. In 2002, US-AEP is helping to create a resource center for medical waste management which will be developed in cooperation with the Environmental Protection Training and Research Institute in Hyderabad, Andhra Pradesh.

Thailand's Chemical Industry Adopts Responsible Care Code of Conduct

Country: Thailand

Prior to US-AEP's involvement, the chemical industry in Thailand was unaware of its responsibility to ensure that employees, local communities, and the environment were protected from chemical waste. Since 1997, US-AEP has been on the ground in Thailand and throughout Asia working with the National Chemical Industry Association promoting the concept of Responsible Care [1]. What makes this initiative so unique is its public dimension; companies are required to make a commitment to the general public, not just to their shareholders and employees. The Thailand Chemical Industry Club's (TCIC) initial application for the adoption of Responsible Care (RC) by the International Council of Chemical Association (ICCA) was denied. However, through US-AEP's assistance, TCIC was successful in its re-application to establish RC-Thailand. From 1997 to 2000 there were 400 participants in various workshops. Starting with only 8 Responsible Care company members in 1997, RC membership increased ten-fold by 2001 to 83 member companies in three regions of Thailand.

1 Responsible Care (RC) is a set of voluntary initiatives undertaken by the chemical industry to help ensure that employees, local communities, and the environment are protected through responsible research, manufacturing, handling, and ultimate disposal of chemicals and chemical products.

For US-AEP's small investment of $10,000, a program was developed which will have great impact on the health and well being of the citizens of Thailand.

Catalyst for Multinationals Considering Implementing Greening the Supply Chain

Countries: India, Philippines, Thailand, Indonesia, Malaysia, Vietnam, Taiwan

Through a variety of environmental and cost-saving initiatives, private sector companies are starting to work on environmental initiatives with their suppliers to "green their supply chain" and are leveraging scant resources to reach small and medium enterprises in developing countries, increasing energy and water conservation and improving environmental practices.

Over the last 7 years, US-AEP has completed a number of Greening the Supply Chain (GSC) activities in 7 countries. "Factory Walk Through" was a video produced under a US-AEP grant of $12,000 to the Federation of Thai Industries and was used a model for developing an ongoing training program in housekeeping and environmental best practices. With this modest investment, US-AEP made itself a world leader in GSC and gained exposure to more than 18 multinationals over the years.

In carrying out these activities, US-AEP has worked with a number of companies as champions to Green the Supply Chain including such giants as Nike, Gap, L.L. Bean, Levi Strauss, and Ford Motor Company Philippines, through its partner, the Business for Social Responsibility (BSR). Other US-AEP GSC partners have included United Technologies Corporation, Nestle, the PAN group in Thailand (suppliers to Nike and Reebok), the P. T. Agro Manunggal Group in Indonesia, Levi Strauss & Co., Texas Instruments, Hewlett-Packard, Gap, Inc., Seagate, Lucent Technologies, Arvind Mafatlal Group in India, PNOC Petrochemical Development Corporation in the Philippines and Pilipinas Shell Petroleum Corporation, among others. In Taiwan, US-AEP developed and finalized the program for the Electronics Industry Printed Circuit Board Training to promote the GSC concept and adoption of Environmental Management Systems and Clean Technology in Asia's printed circuit board industry.

A multiplier effect is built naturally into GSC--Nestle reached over 3,000 of its suppliers and Ford Motor Company Philippines, Inc. reached all of its first tier suppliers and some of the second tier suppliers to green their supply chain. It is estimated that all these activities leveraged over $1 million from the multinationals since 1995.

Financial Due Diligence Raises Environmental Standards

Countries: Philippines, Sri Lanka, Samoa, Indonesia, Thailand

Throughout Asia the industrial sector accounts for an increasingly larger share of overall growth with most of that growth financed by private sector debt financing. US-AEP has recognized that Asia's management of those lending and investment flows is critical to sustainable development.

Acting on that insight, US-AEP nurtured multi-year partnerships with key banks and with the Association of Development Finance Institutions of the Asia Pacific (ADFIAP) to promote environmental due diligence within the investment community. ADFIAP is the key umbrella organization for development finance in Asia. With 70 member-institutions in 34 countries, ADFIAP is working in partnership with US-AEP to ratchet up the environmental standards of its members to that of international financial institutions.

The results to date have been impressive. In the Philippines, for example, the Landbank has set up a specific Environmental Unit tasked with environmental analysis of all project financing, expanded their capacity to finance waste and water projects and incorporated environmental factors into its lending operations. With assistance from US-AEP, Landbank also expanded its Environmental Unit, accredited 13 environmental consulting firms that can be tapped for technical evaluations, and conducted environmental training programs for over 2,000 people from its own project staff and client banks.

Also in the Philippines, the Development Bank of the Philippines (DBP), one of the country's largest financial institutions, launched a code of environmental conduct for all banks that borrow from them. DBP has also revised their credit evaluation forms to incorporate environmental issues. They are also using interest rates as an instrument to encourage borrowers to include environmental considerations in their investment decisions. These include environmental targets such as pollution reduction in the loan agreement. In Sri Lanka credit analysis procedures were revised at the Bank of Ceylon to include environmental factors.

More broadly US-AEP's current partnership with ADFIAP concentrates on getting all members committed to environmental good practice. Specifically we are promoting a commitment of each member institution to adapt an environmental policy that will be approved by the Board of Directors and incorporated to its overall business philosophy. Each member will also designate a bank officer or a unit to be the "environment point person (s)" in each bank to look after environment issues and concerns in its day-to-day operations. All members have been surveyed and ADFIAP and its members have funded international training seminars to reach this goal.

During the last year many institutions have signed up and made commitments to environmental good practices. Some of the banks include the Trade & Investment Corporation of the Philippines, the DFCC Bank (Sri Lanka), the Development Bank of Samoa, the Bank Ekspor Indonesia, and the Industrial Finance Corporation of Thailand. In addition others have pledged to follow suit. Some of these include the National Bank for Foreign Economic Activity of the Republic of Uzbekistan, the Nepal Development Bank Limited, Asia Trust Bank and the Vietnam Export-Import Bank

So far nearly half the ADFIAP's 76 members have made these commitments of corporate environmental policy and environmental officers. Further plans are in place to achieve 100% compliance. The on the ground result has been a significant improvement in the environmental analysis that banks conduct prior to financing industrial lending. Even more important, this means a reduction and mitigation of pollution in Asian societies and direct benefit to the thousands of people working within or living near industrial sites.

Arsenic Removal for Safe Drinking Water

Country: India

Arsenic poisoning has become an epidemic in the West Bengal region of India (as well as Bangladesh), where the naturally occurring arsenic has been contaminating the underground water supply. Since 1998, US-AEP has been engaged in a series of activities aimed at the arsenic contamination in this region, where over 6 million people, in nine different districts of West Bengal, rely on groundwater wells as the primary source of drinking water.

US-AEP's activities have been focused in the transfer of arsenic removal technologies and expertise from the Unties States to India. After a variety of grants and exchanges gained the trust of Indian decision-makers, the next challenge was to identify appropriate technologies with compact systems that could operate effectively and would require low investment and operational costs. US-AEP's Environmental Technology Network for Asia (ETNA) program identified two companies with compact treatment systems with arsenic removal capabilities. In 2001, the Rajiv Ghandhi Drinking Water Mission approved the purchase of water treatment equipment from two US companies. This approval was granted after UNICEF recognized the creditability of both technologies for the removal of arsenic from drinking water. US-AEP has also contributed to the improvement of environmental management issues in the field, providing a targeted forum for exchanges of ideas and practices and facilitating technology demonstrations.

For an expenditure of $260,270 by US-AEP, over 6 million people have been impacted in West Bengal alone, which is a cost of less than $0.04 per person.

Potable Drinking Water for Millions of Disadvantaged People

Country: Philippines

An important issue in making potable drinking water available and affordable to disadvantaged populations is preventing illegal taps and loss due to faulty distribution systems. Until US-AEP stepped in with its partners, the Ford Metering Company and The Asian Development Bank, to provide technical expertise, know-how through up-to-date practices, and equipment, more than 60% of the potable water that went into the distribution system in Manila and Maynilad was either lost or stolen.

In 2001, Maynilad Concession signed an agreement with Ford Metering Box Company (IN) for the supply of equipment, including repair clamps, service connections, and meters. Additional service connections made possible expansion of the distribution network to provide potable water access directly to households on the west side of the Manila.

Taiwan Cement Complies with New NOx Standards to Improve the Lives of Millions

Country: Taiwan

One of the leading contributors to Taiwan's environmental problems is Nitrogen oxide (NOx), a group of highly reactive gases. In humans, exposure to these gases effects breathing and the respiratory system, and causes damage to lung tissue and premature death. In the environment, NOx causes acid rain, which poisons soils and water bodies (making the water unsuitable for some fish and other wildlife), and damages trees. NOx also causes smog, contributes to global warming and speeds the decay of buildings.

In an effort to reduce the presence of NOx, in 1998 the Taiwan EPA set tough new standards which forced Taiwanese industries to reduce their NOx emissions or face substantial and possibly financially debilitating fines. Taiwan Cement, faced with these new environmental regulations, had to reduce its NOx emissions by more than 50% to meet the new standards. In fact, Taiwan Cement determined that it had to reduce its NOx emissions by 4000 metric tons per year- a challenge that required a unique combination of system design, modifications, and changing operational practices.

The cement manufacturer turned to US-AEP to help them find most effective NOx reduction technologies. With US-AEP's assistance, they examined various technologies and operational practices in the United States. In the process, they were introduced to the advanced technologies of Fuel Tech, Inc. Fuel Tech recommended combustion modifications and Selective Non-Catalytic Reduction for reducing the NOx emission levels. Within two years, all the proposed modifications were made. Thanks to US-AEP's grant of $22,000 and U.S. technology, Taiwan Cement has reduced its NOx emissions by nearly 50% and is in compliance with emission standards, saving themselves hefty fines and contributing to the improvement of the lives of over 22 million Taiwanese people.

EXHIBIT 4

North Carolina-Taiwan:
Environmental Center for Livestock Waste Management
A Lesson in University Teamwork

Project Dates: June 2000- March 2003
North Carolina State University (CALS Animal Waste Program), Oregon State University, Iowa State University, Purdue University, Illinois Institute of Technology, USDA, A.O. SmithAeromix Systems, Agri-Bio Systems, Bioweb, Chicago Industrial Pump Company, Insta-Pro, Oceco, RayDot, Equipment Manufacturers Institute
National Pingtung University of Science and Technology
Grant Award: $150,000
Match: $925,000
Total Investment: $1,075,000

Plans for the US-AEP led Environmental Center for Livestock Waste Management (ECLWM) began in 1996 after pig farm waste was identified as one of South East Asia's major environmental problems. This partnership involved Taiwan, which invested nearly $2 million into the Center's operation and construction, five U.S. universities who donated their engineering services to design an innovative waste treatment system and US manufactures who donated equipment.

The US Department of Agriculture provided extension and engineering services to explore the reserve transfer of the system's benefits for American farms and policy makers. The construction began in Taiwan at the National Pingtung University of Science and Technology in 1999 and is officially open. (See picture above).

This project proposed continued involvement of the U.S./Taiwan team during the first three years of the Center's operations. The Center is envisioned as the foundation of excellence for research, training and demonstration of advanced livestock waste management. The major objectives of this project are to advance the state of the art swine production/waste management by conducting research, demonstrations, evaluations, technical training and student and faculty exchanges with cooperating universities. The project is focusing on the issues of odor, water and air quality, animal waste utilization, alternate treatment technologies, pathogens, food safety, animal nutrition and ecosystem effects.

The US team continues to provide support for the Fourth International Livestock Waste Management Symposium and Technology Expo to be held in Penang May 19-23, 2002. The U.S. team is cooperating with Taiwan to help put together presentations on the goals and results of treatment technologies being evaluated at the Environmental Center for Livestock Waste Management.

EXHIBIT 5

US-AEP

United States Agency for International Development

US-AEP Environmental Regulatory Dialogue

Expanding Regulatory Dialogue in Asia – Partner Update – Spring 2002

Catalyzing Improved Laws and Policies

Under the Environmental Regulatory Dialogue program, the U.S.-Asia Environmental Partnership (US-AEP), the U.S. Environmental Protection (EPA) and the World Bank and other donors are working to expand dialogue on the adoption of improved environmental laws, policies and institutions among Asian officials, judges, legislators, private sector leaders, local communities, environmental groups, universities and other practitioners and experts.

Proven Country-Driven Approach

Under the Regulatory Dialogue, each year US-AEP and its partners join with in-country agencies and organizations to implement an integrated series of activities that support the development of draft laws, policies, or action plans by following a proven country-driven approach:

Step 1: Identify and define priority reform areas;
Step 2: Establish stakeholder working group;
Step 3: Formulate draft policy with U.S. or Asian counterparts via video-conferences and observational tours;
Step 4: Organize in-country international workshop to refine draft law, policy, plan or recommendations.

Regional Priority Reform Areas

Over the last two years, US-AEP has facilitated policy dialogue in Thailand, Vietnam and the Philippines in four priority policy reform areas:

1. Public Participation
2. Environmental Funds and Economic Instruments
3. Enforcement and Compliance
4. Institutional Reform and Decentralization.

While each country is at a different stage in policy formulation and implementation due to legal, institutional, political and social factors, all have a strong interest in exchange with regional and U.S. counterparts. What follows is a brief summary of major activities over the last six months in each of these four core areas for each country.

1. Public Participation

Strengthening public involvement in governmental decision-making is a key reform initiative in many Asian economies. While US-AEP has significant activities underway in Thailand and the Philippines, we are also developing or tracking new initiatives in Vietnam and Indonesia. In Vietnam, for example, US-AEP has helped facilitate the establishment of a stakeholder working group to initiate dialogue on a new policy

Gov. Christine Todd Whitman, U.S. EPA's Administrator, and Ambassador Darryl Johnson host Thai Senate, Supreme Administrative Court, agency and civil society leaders to discuss public participation.

"We are especially thankful for the continued support of US-AEP. I am so appreciative of their commitment to environmental protection in Thailand."

Gov. Christine Todd Whitman
Administrator, U.S. Environmental Protection Agency
Bangkok, January 14, 2002

on public participation in environmental decision-making and enforcement. In Indonesia, US-AEP is exploring approaches for supporting efforts by the Ministry of Environment in implementing a new Good Environmental Governance (GEG) program. Indonesian organizations and agencies are actively discussing new laws and policies on access to information and public participation.

Facilitating Dialogue with U.S. EPA Administrator

In Thailand, US-AEP and EPA work with senior officials and decision-makers to promote strategies for strengthening public involvement in environmental decision-making. As part of this program, in January US-AEP and EPA organized a luncheon meeting between Gov. Christine Whitman, EPA Administrator, during her visit to Bangkok, and partners from the Thai Senate, Supreme Administrative Court, environmental agencies and civil society. Hosted by Ambassador Darryl Johnson, discussion focused on sharing experience in public involvement, and strengthening cooperation to ensure continued achievements in promoting effective reforms.

EXHIBIT 6

US-AEP INDONESIA

FOUR YEARS OF US-AEP WATER/WASTEWATER INITIATIVES AS AT APRIL 2002

Project	Description of Project	Follow-on AID	AEP Invest	AID Invest	AEP Lev	AID Lev	Results to Date
COMPLETED PROJECTS							
WET	Water Efficiency Team	LGWS	380	5800	52	5	$13 million in new connections, $7 million in subsidy reduction
WETTER	Low Cost Production Increase	In LGWS	60	0	3	0	Production increased up to 70% saving $180,000 in 3 locations
WISE	Customer Satisfaction Survey	In CLEAN	140	20	1	7	Thirty surveys conducted to date for $150,000 for planning
WILD	Local Women's Groups	WILLOWS	50	248	5	0	More than 140 new womens groups link water to provincial people
WEFT	Enterprise Managers Training	In LGWS	20	0	2	0	More than 47 enterprise directors paid $32,900 tuition in FY 01
ONGOING/APPROVED PROJECTS							**Notes**
TOMCAT	Certification of Water Treatmt Operators		25	0			Certification of water treatment operators=professionalism
UPDATE	Urban Poor Water Access Study		140	0			Can help urban poor get water while increasing revenues
SAVER	Industrial Estates Production Increase		60	0			Efficiency possible in industrial estates using re-rating
PREP	Decentralized Training Study		35	0			Decentralization of training is cost effective/sustainable
WEFT-2	Lower Level Training Modules		22	0			There is positive leverage to training lower level skills
VIP	Vietnam/Indo/Phils Water Network		11	0			There is a felt need for utility network regional cooperation

Acronyms:

CLEAN	Community Leveraged Environmental Action Networks
LGWS	Local Government Water Services
PREP	Pre-feasibility Reconaissance for Education in the Provinces
SAVER	Sustainable Appreciation of Value through Efficiency and Re-rating
TOMCAT	Treatment Operators/Managers Certification and Training
UPDATE	Urban Poor Data Acquisition and Technical Evaluation
VIP	Vietnam-Indonesia-Philippines Water Associations Exchange
WEFT	Water Enterprise Functional Training
WET	Water Efficiency Team
WETTER	Water Efficiency Team Technology for Establishment of Re-rating
WILD	Women's Institutions for Local Development
WILLOWS	Women's Institutions for Local Leveraging of Water Supply
WISE	Water Indicators for Satisfaction Evaluation

EXHIBIT 7

US-AEP

United States Agency for International Development

US-AEP Environmental Regulatory Dialogue

Promoting Dialogue on Environmental Dispute Resolution in Thailand

Expanding Regulatory Dialogue in Asia

Under the Environmental Regulatory Dialogue program, the United States-Asia Environmental Partnership (US-AEP) and its partner the U.S. Environmental Protection Agency (EPA) facilitate access to international best practices through exchange between counterpart agencies, organizations and practitioners. In particular, US-AEP works closely with partner agencies and organizations through collaborative activities, such as conferences, workshops, study tours, teleconferences and strategic partnerships.

ADR and the Environment in Thailand

Despite the establishment of a comprehensive legal framework for environmental management, there are serious and on-going controversies in Thailand related to industrial pollution, and the siting of municipal waste and water treatment facilities. As demonstrated by the recent Administrative Court decision to enjoin operations at the Ratchathewa landfill in Bang Phli, parties are increasingly resorting to the courts.

Alternative dispute resolution (ADR) enables the settlement of disputes outside of the courts. Through ADR, parties resolve controversies through facilitation, mediation, or consensus building. For environmental disputes, ADR has proven to be effective strategy for communities, industry and government to avoid costly and time-consuming litigation, and build enduring partnerships.

Thailand has significant experience with ADR through a range of agencies and organizations, including the Courts of Justice, Office of Attorney General, Ministry of Science, Technology and Environment (MoSTE), and King Prajadhipok's Institute (KPI), a research body attached to the Parliament.

Promoting ADR and the Environment

Building on the Thai experience with ADR, US-AEP and EPA will work in partnership with MoSTE and KPI to implement a series of activities promoting the resolution of environmental disputes through ADR with the following objectives:

- Develop a policy and legal framework for environmental agencies to implement ADR;
- Identify capacity building needs and develop a capacity building program; and
- Establish strategic partnerships between U.S. and Thai environmental agencies and organizations.

In developing activities to meet these objectives, we wil establish a working group consisting of agencies, industry environmental groups, communities and academia.

Thai Members of Parliament, senior judges, prosecutors, agency officials, academics and environmental groups establish a new partnership through a teleconference with EPA experts on alternative dispute resolution.

Program of International Collaboration

In October 2001, as a first step, KPI, US-AEP and EPA organized a teleconference between Thai agencies and organizations and EPA experts to begin a dialogue on ADR policy and practice for the environment.

During 2002 MoSTE, KPI, EPA and US-AEP will collaborate on the following activities:

- Teleconference — To continue technical exchange between the working group and EPA experts on priority issues and strategies for cooperation (March 8).
- Study Tour to U.S. – To strengthen capacity and build partnership, key Thai officials and experts will meet with EPA and other agencies and organizations while attending a conference on ADR in Arizona (May 11-18).
- International Workshop in Bangkok – To exchange views on a proposed policy framework and capacity program for ADR for the environment, and strengthen international partnership (August 21-22).

For Additional Information

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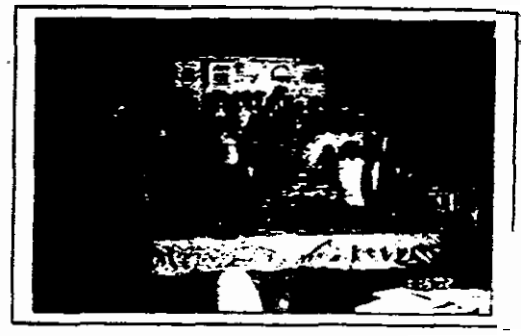
USAID

EXHIBIT 8

Maryland-Thailand Air Quality Initiative Project
Multi-level Partnerships Implement Decentralization

Project Dates: June 2000- August 2002
Maryland Department of the Environment
Thailand Pollution Control Department
Grant Award: $150,000
Match: $193,818



For the past three years, the Maryland Department of the Environment has been working in partnership with the Thailand federal Pollution Control Department, USEPA, US-AEP, and the Thai government's Entrain program to build the capacity of Thai federal and local environmental protection staff to address air quality challenges. One of the strengths of this project is the commitment to a strong partnership between Maryland and Thailand.

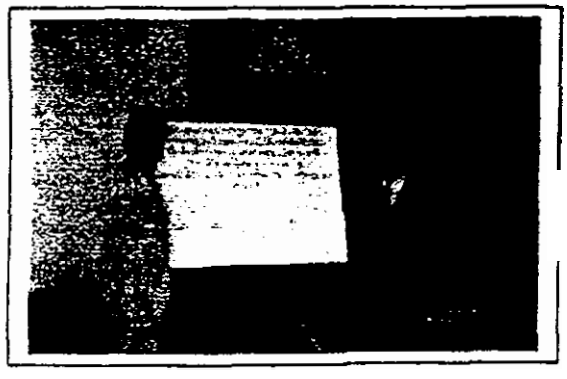
On September 11, 2001 the Maryland staff were at a reception at the US Consulate in Chiang Mai representing the true commitment to the partnership with the Thailand Pollution Control Department, even in the face of national tragedy.

> *Unfortunately, the great feelings of hope and good will that we had at the reception were chased away by the terrible events in the United States. Even while we tried to make sense of the terrorist attack, we knew that there are so many good stories to tell the world of Americans and our government working with different countries and citizens throughout the world to improve the quality of life everywhere. Despite our anguish, we committed ourselves to ensuring that the Workshop the next day would be a great success, a triumph of hope and change – and it was.*
> John Mitchell, MDE Special Assistant

The strong partnership developed over the past two years was exemplified by numerous exchanges. Thai officials visited the United States nine times for onsite visits and training by Maryland's Department of the Environment. Maryland sent teams to Thailand five times to conduct training workshops and seminars.

Due to the strong partnership between the delegations, the project successfully met its goals. First, the partners developed and produced a model for air quality planning entitled the "Air Quality Management Plan" to address areas in air pollution sources where the public could take action to reduce air pollution in Chiang Mai. Second, the project built upon the existing Thailand Entrain program, an external program funded by the PCD to strengthen staff through international exchanges and training opportunities. The project's numerous workshops and exchanges significantly improved the quality and capability of the staff from the Thailand Pollution Control Department to handle their new responsibility. Third, the project strengthened communication and networking among Thai air quality protection staff from all levels of government including federal, provincial and municipal.

In the US, the Environmental Protection Agency has gradually shifted from a federally centralized approach to a state-centered program. States are more active than ever in taking responsibility for addressing their environmental concerns. MDE Secretary Jane Nishida accompanied the USEPA International Program Director to Thailand for the MOU signing with MOSTE, leading her state's commitment to Thailand. The Maryland DOE transferred the lessons learned from decentralization in the US experience to Thailand. In result, Thailand gradually delegated the responsibility for air quality management from federal control to its provinces and municipalities.



The final workshop in Chiang Mai, January 14-15, 2002 demonstrated the decentralization and partnership approaches to addressing environmental concerns. The highly intensive and interactive two-day event brought together individuals from the Municipal Government of Chiang Mai, the Thailand PCD and a cross-section of 80 community leaders. The attendees committed to the Pledge to make

Data collected to date gives the aggregate dollar value of **$222,319,708** resulting from trade show activities.

Sales By Event

A&WMA	$2,072,649
WEFTEC	$198,741,684*
WasteExpo	$21,505,375**

* Includes a $192 million infrastructure project
** Includes a $15 million infrastructure project

Cost-Benefit Chart for Trade Shows

Event	Total Grants Awarded	Total Value of Successes	Input/Output Ratio I	Input/Output Ratio II
A&WMA	$652,263	$2,072,649	$1-$3.18	$1-$3.18
WEFTEC	$754,628	$198,741,684*	$1-$263.36	$1-$8.93***
WasteExpo	$440,622	$21,505,375**	$1-$48.81	$1-$14.76***
Total	**$1,847,513**	**$222,319,708**	**$1-$120.33**	**$1-$8.29**

* Includes a $192 million infrastructure project
** Includes a $15 million infrastructure project
*** This ratio does not include the two large infrastructure projects.

Country Breakdown

Hong Kong:
Total Value of Successes: **$523,788** (4 Agent-distributor agreements, 1 Business Relationship, 14 Direct Sales)
Success Per Event: WEFTEC: 14 ($292,568) Water & Wastewater sectors
A&WMA: 5 ($231,220) Air Pollution & Wastewater
WasteExpo: 0

India:
Total Value of Successes: **$341,745** (2 Agent-distributor agreements, 2 Business Relationship, 3 Direct Sales, 1 Joint Venture)
Success Per Event: WEFTEC: 4 ($24,758) Water & Wastewater sectors
A&WMA: 1 ($0) Air Pollution
WasteExpo: 2 ($316,987) Solid Waste

Indonesia:
Total Value of Successes: **$655,000** (2 Business Relationship, 2 Direct Sales)
Success Per Event: WEFTEC: 2 ($655,000) Water & Wastewater sectors
A&WMA: 2 ($0) Air Pollution & Instrumentation
WasteExpo: 0

EXHIBIT 10

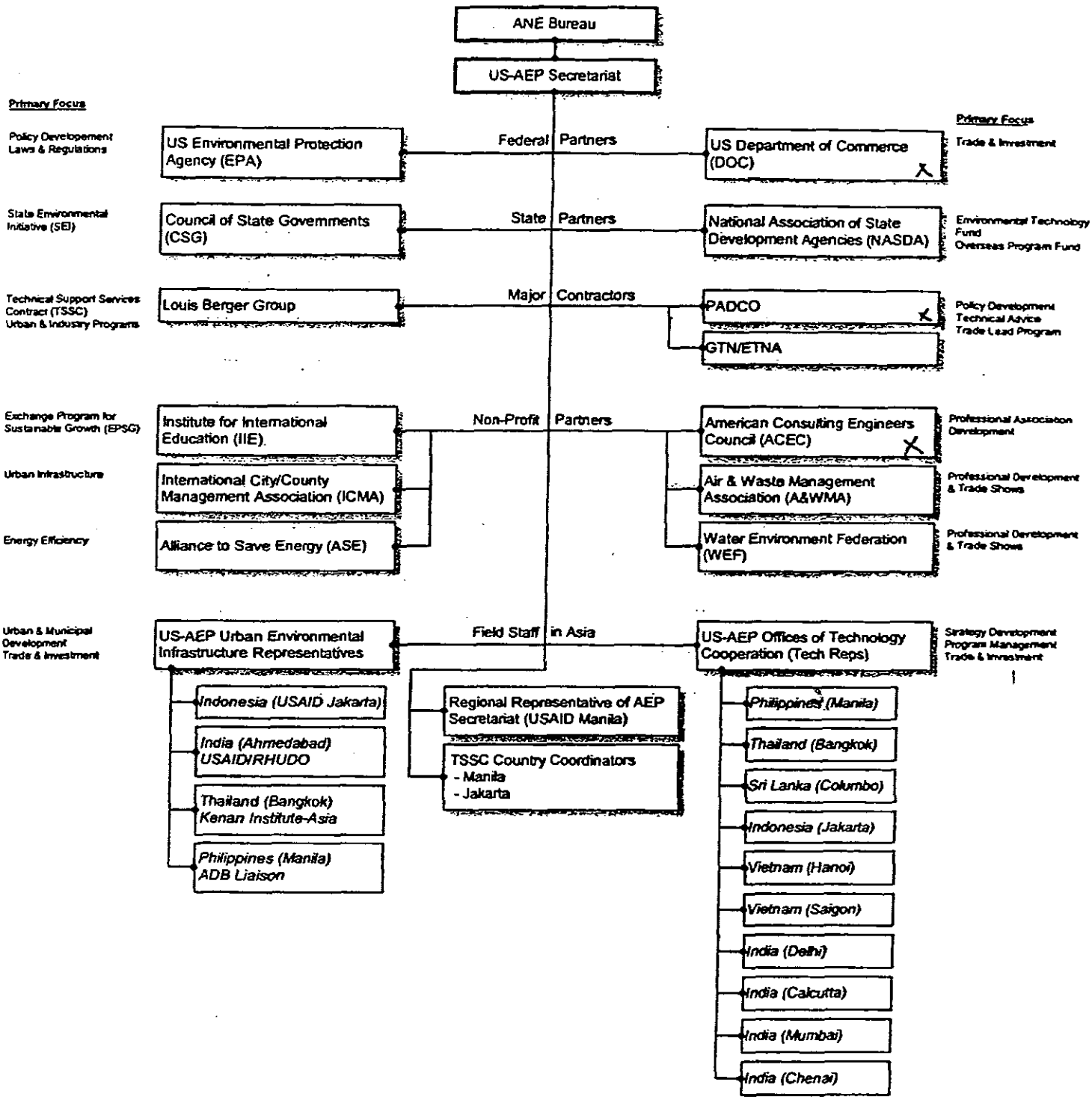

ANE Bureau
US-AEP Secretariat
Primary Focus
Policy Development Laws & Regulations
US Environmental Protection Agency (EPA)
Federal Partners
US Department of Commerce (DOC)
Primary Focus
Trade & Investment
State Environmental Initiative (SEI)
Council of State Governments (CSG)
State Partners
National Association of State Development Agencies (NASDA)
Environmental Technology Fund
Overseas Program Fund
Technical Support Services Contract (TSSC)
Urban & Industry Programs
Louis Berger Group
Major Contractors
PADCO
GTN/ETNA
Policy Development
Technical Advice
Trade Lead Program
Exchange Program for Sustainable Growth (EPSG)
Institute for International Education (IIE)
Non-Profit Partners
American Consulting Engineers Council (ACEC)
Professional Association Development
Urban Infrastructure
International City/County Management Association (ICMA)
Air & Waste Management Association (A&WMA)
Professional Development & Trade Shows
Energy Efficiency
Alliance to Save Energy (ASE)
Water Environment Federation (WEF)
Professional Development & Trade Shows
Urban & Municipal Development
Trade & Investment
US-AEP Urban Environmental Infrastructure Representatives
Field Staff in Asia
US-AEP Offices of Technology Cooperation (Tech Reps)
Strategy Development
Program Management
Trade & Investment
Indonesia (USAID Jakarta)
India (Ahmedabad) USAID/RHUDO
Thailand (Bangkok) Kenan Institute-Asia
Philippines (Manila) ADB Liaison
Regional Representative of AEP Secretariat (USAID Manila)
TSSC Country Coordinators
- Manila
- Jakarta
Philippines (Manila)
Thailand (Bangkok)
Sri Lanka (Columbo)
Indonesia (Jakarta)
Vietnam (Hanoi)
Vietnam (Saigon)
India (Delhi)
India (Calcutta)
India (Mumbai)
India (Chenai)

EXHIBIT 11

Total Number of USG, Contractor and Cooperator Personnel Supported by US-AEP

	U.S.	Asia
U.S. Government – Secretariat		
USAID/ANE Direct Hires (OE)*	4	
USDA RSSAs	2	
U.S. PSCs (Manila)		1
AAAS Fellow**	1	
U.S. Government – Other		
EPA	2	
GTN/ETNA (contractors)	3	
FSN (Sri Lanka)		1
DOC***		20
RUDOs (contracts through)		2
Contractors		
Inst. For International Education	12	2
TSSC	20	5
EPIQ**	0.5	1.5
PADCO**	1	1
Cooperators		
Council of State Governments	1.5	
National Association of State Development Agencies**	2	
Kenan Institute		1
Alliance to Save Energy	2	
TOTAL: 85	**51**	**34**

* One direct hire is leaving 20 May 2002 and another October 1st.
**Expires or funding ends in summer 2002, reducing the total by 8 to 77.
***Beginning in FY 2003, these staff will either move into Missions or be covered by an alternative contractual mechanism.

NOTE: The number is less than the count done last summer for three main reasons:

1) A streamlined TSSC, which combines several contracts into one.
2) A decrease in the number of USAEP field offices.
3) The last count included a "Part Time" column that captured all people doing any work on USAEP, including ones working very few hours for USAEP, artificially inflating the total.

EXHIBIT 12

US-AEP' s Environmental Sectors

	Improving Public Policy & Environmental. Regulations	Strengthen Institutions for Environmental Protection	Air Quality Improvement	Solid & Hazardous Waste Management	Water & Wastewater management	Industrial Environmental Management	Energy Efficiency
India	✓	✓	✓	✓	✓	✓	✓
Indonesia	✓	✓	✓		✓	✓	✓
Sri Lanka		✓	✓	✓	✓	✓	✓
The Philippines		✓	✓	✓	✓	✓	✓
Thailand	✓	✓	✓	✓	✓	✓	✓
Vietnam	✓	✓	✓	✓	✓	✓	✓

CONTRACT NO. EPP-I-00-03-00013-00
ORDER NO. 801

US-AEP STRATEGY AND PROGRAM DESIGN:
Strategic Assessment Report

International Resources Group

Submitted to:

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Regional Coordinator US-AEP
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Submitted by:

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September 30, 2004

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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
APMA	Air Pollution in Mega-cities of Asia
AQM	Air Quality Management
ASEAN	Association of South East Asian Nations
AUSaid	Australian Agency for International Development
BAQ	Better Air Quality (Conference)
BMR	Bangkok Metropolitan Region
CAI-Asia	Clean Air Initiative for Asia
CATNET	Clean Air Initiative Training Network
CCP	Cities for Climate Protection (Campaign)
CDS	City Development Strategy
CIDA	Canadian International Development Agency
CNG	Compressed Natural Gas
CPCB	Central Pollution Control Board (India)
CSE	Center for Science and Environment (India)
CUP	Clean Up Pollution (India Campaign)
DFID	Department for International Development
DIESEL	Developing Integrated Emissions Strategies for Existing Land Transport
EPIQ	Environmental Policy and Institutional Strengthening Indefinite Quantities Contract
ESC	(ASEAN Working Group on) Environmentally Sustainable Cities
GHG	Greenhouse Gas
GWP	Global Water Partnership
I&M	Inspection and Maintenance (Program)
ICLEI	International Council for Local Environmental Initiatives
IES	Integrated Environmental Strategies (Program)
IEST	Initiative on Environmentally Sustainable Transport
IWRM	Integrated Water Resources Management

JICA	Japan International Cooperation Agency
MDG	Millennium Development Goal
MRC	Mekong River Commission
NARBO	Network of Asian River Basin Organizations
NRW	Non-revenue Water
O&M	Operations and Maintenance (Costs)
PCB	Pollution Control Board (India)
PM-2.5	Particulate Matter – less than 2.5 microns in diameter
PM-10	Particulate Matter – less than 10 microns in diameter
PSUTA	Partnership for Sustainable Urban Transport in Asia
RDM	USAID Regional Development Mission (Bangkok)
SASEC	South Asia Sub-regional Economic Cooperation
SDWA	Safe Drinking Water Alliance
SEAWUN	Southeast Asia Water Utilities Network
SPM	Suspended Particulate Matter
SSWP	Small Scale Water Provider
TSP	Total Suspended Particulates
UNEP	United Nations Environmental Programme
UNESCAP	UN Economic and Social Commission for Asia and the Pacific
US-AEP	US Asia Environmental Partnership
USAID	US Agency for International Development
USEPA	US Environmental Protection Agency
WAC	Water for Asian Cities
WHO	World Health Organization
WPI	Water for the Poor Presidential Initiative

EXECUTIVE SUMMARY

Under the Environmental Policy and Institutional Strengthening IQC (EPIQ II), International Resources Group (IRG) has been tasked to assist US-AEP in preparing its new five-year strategy. This report is among the key deliverables requested from IRG by US-AEP.

In preparing this report, IRG conducted consultations in the U.S, visited the six current US-AEP countries (India, Indonesia, Philippines, Sri Lanka, Thailand, and Vietnam), Bangladesh and Laos, and conducted telephone and email interviews with experts in Cambodia, China, Nepal, and Pakistan. The Assessment Team also reviewed a large volume of reports and documents related to environmental problems in Asia, current USAID and US-AEP programs, and assistance programs executed by other bilateral and multilateral donors.

Why focus on urban development challenges?

The Concept Paper proposes to concentrate US-AEP program resources on urban problems. Although rural populations suffer from many of the same water and air-related diseases and illnesses as residents in cities, a case can be made for an urban focus. In the next 20 years, the population of the region will grow by more than one billion people with virtually all of Asia's population growth concentrated in cities. The consequences of the urban growth will be the rapid growth of mega-cities, with many of the major cities in the developing countries of Asia reaching populations of between 15 and 20 million people by 2015.

The growth of cities will result from population increases among current urban residents, combined with rural-urban migration. Rural-urban migration trends are influenced by the inability of rural areas to sustain economic livelihoods for the rural population. For many, the only possible option if they are to feed their families is to move to the urban area in the hope of finding work.

In Asia's cities, the health and economic impacts of poor water, sanitation, and air pollution are borne mainly by low income groups living in informal settlements. Most of new arrivals from rural areas are absorbed by the informal settlements, already poorly served by public services. The inadequate provision of services such as sanitation and water has severe consequences for these populations. The lack of sanitation, coupled with the density of population in urban areas, serves to pollute the surface and groundwater resources within the urban area and this compounds the problem.

Urban growth also will result in commensurate increases in motorization and energy consumption, both expected to adversely affect urban air quality and increase greenhouse gas (GHG) emissions substantially within the region.

Urban water or air?

IRG examined urban water and air issues from three perspectives – economic growth, health, and impact on low income groups – to better determine the relative importance of addressing these in terms of the division of program resources. The findings of this report confirm the value of focusing the US-

AEP program on urban water and air, with governance as a crosscutting issue. However, we believe there is a compelling case for focusing more program resources on urban water than air when these program areas are evaluated in terms of the three perspectives above.

For water:

- 63% of the population of Asia does not have access to clean water and 80% do not have access to improved sanitation.
- Unsafe drinking water and sanitation contribute to high rates of morbidity and mortality, particularly among children five years old and younger. In Asia, diarrhea accounts for 18% of infant mortality compared to malaria (2%) and HIV/AIDS (1%).
- Asian cities are plagued by high incidence of diarrheal illnesses and episodic outbreaks of water-related diseases such as cholera. Infant mortality rates are 10 to 20 times higher in cities without adequate water and sanitation services.
- The lack of access to safe sources of drinking water has direct and significant economic impacts on the urban poor, as they often pay appreciably more in absolute terms for water and/or invest time to "harvest" water at wells and public standpipes.
- Poor water quality and availability can be a significant constraint on economic growth, discouraging large companies from locating in urban areas with poor water services, and limiting the growth of small and medium enterprises.
- Given that gathering water is a very time-consuming job, generally assigned to women, in many cases, it presents a barrier that precludes women from seeking more productive employment and young girls from attending school.

For air:

- Urban air pollution is a significant source of health risk, accounting for 500,000 to 1 million deaths per year in Asia. Air pollution results in respiratory illness and premature death, but ranks behind water in terms of mortality and morbidity impacts.
- All urban residents suffer economic losses because of air pollution due to lost wages from respiratory illness and higher medical costs, but poor air quality does not have the same impact of discouraging economic growth.
- The overall health burden of air pollution is greater for the poor because of longer daily outdoor exposure to air pollution, their proximity to roadways and industry, poor ventilation of their sub-standard housing, and reliance on biomass fuels for cooking and heating.

In virtually all of the consultations, weak governance was noted as one of the major barriers to improved access to clean water, urban air quality, and environmental quality in general. Asian nations have made strides in enacting environmental legislation, but there are still significant gaps to be addressed to

strengthen public participation in environmental governance, facilitate the implementation of investments in water access and sanitation, and design effective air quality programs. There is a need to improve policies and legislation in combination with capacity building to ensure staff has the appropriate skills and resources to execute management authorities. The lack of institutional capacity is particularly problematic where management and enforcement responsibilities are devolved to poorly staffed and financed regional and local authorities. Urban residents appear to be more keenly attuned to air pollution issues than to water access and quality. Improved public awareness can provide a catalyst for a greater role for civil society in decision making and prepare public groups to make better contributions, once they have secured a greater role.

What can US-AEP do to address these problems?

US-AEP is already engaged in providing technical assistance in the six program countries in the areas of water, urban air, and governance. This experience provides an important base and set of lessons learned that will be important to consider in developing the new regional US-AEP program. Both urban problems pose major challenges and US-AEP must continue to draw on its strengths: facilitating partnerships, leveraging other donors' resources and capitalizing on its capacity to share experiences across the region. As a regional program, US-AEP can look widely for partners in Asia, draw from its pool of US private and public sector partners, and work at the local level to achieve impact that can then be aggregated or even multiplied across the region. The focus on urban water and air also plays to regional sharing of experience because all Asian cities face the same set of challenges – legal structures and institutions may differ but they all strive to reduce the impacts of unsafe water and air.

As US-AEP looks to the future, it will need to cultivate strategic partners that bring resources and influence that can be leveraged, multiplied, and sustained. In the past, many of US-AEP's Asian partners were simply beneficiaries of program activities such as exchanges and workshops. Given the emerging model in Asia of development *cooperation* instead of development *assistance,* Asian partners will be called on more often to lead and implement US-AEP activities. US-AEP will need to work closely with governmental agencies and water utilities in Asia, and will need to expand its cooperation with NGOs and community groups in addressing water access issues.

U.S. private and public sector partners will still be featured prominently in the US-AEP program to transfer technologies and expertise and participate in twinning arrangements to improve enabling conditions in water and air and build institutional capacity. In order to leverage resources, US-AEP also will need to cultivate more international partners and look for opportunities to work with USAID/Washington programs and the bilateral missions in the region, as well as other donors and with multi-donor initiatives.

1 INTRODUCTION

1.1 Background

The US-Asia Environmental Partnership (US-AEP) program was created in 1992 to foster the transfer of environmental technology and expertise to Asia. The program works predominantly through direct peer-to-peer contacts to develop and implement practical solutions to environmental problems, bringing experts and practitioners together to share knowledge and to act directly and in concert to solve problems. Some activities create private-private and private-public partnerships that endure beyond US-AEP funding. US-AEP also has a small grants component that brings environmental experts, NGOs, and government entities into the program to share knowledge and expertise.

In its 12-year tenure, US-AEP has retained the "partnership" as its salient feature, but has transitioned through three phases. In the **first phase**, the focus was on the promotion of trade opportunities for US firms to sell environmental technologies to Asia. US-AEP staff facilitated partnerships between private companies in the US and Asian facilities. These partnerships have reportedly generated over $1 billion of US environmental technology exports to Asia since 1992.[1]

In the mid-90s, following an assessment of US-AEP, the program adopted a new strategic vision related to a "clean revolution" for Asia. Trade promotion activities continued during this **second phase**, but were more narrowly focused on greening of Asian businesses amidst growing environmental problems associated with widespread and rapid urbanization and industrialization.

The current approved goal of US-AEP, adopted in the mid-90s, is to encourage a clean revolution in Asia. However, with the withdrawal of the Department of Commerce's support for US-AEP in 2002, the program entered a **third phase**. Absent a new strategic plan, the US-AEP program has shifted its activities closer to USAID bilateral programs in select Asian countries. While the transfer of environmental technologies continues as a program component, US-AEP has expanded its reach to include greater focus on improved environmental governance and has fostered a broad array of partnerships involving Asian governments, NGOs, trade associations, and the private sector. In addition, US-AEP has facilitated exchanges between Asian countries.

US-AEP has also undergone additional program and management changes, namely: (1) a reduction in the number of countries covered by the program, from the original 11 to the current six; (2) a shift in management in late 2003 from USAID/W to the new Regional Development Mission (RDM/A) in Bangkok; and (3) the extension of the program through September 30, 2006.

[1] The US-Asia Environmental Partnership (US-AEP) Program: Concept Paper, USAID/RDM/A, April 5, 2004, p.4.

1.2 A New US-AEP Strategy

To help set the programmatic direction for the next few years, the RDM/A prepared the Concept Paper[2] that proposes to focus US-AEP on water and air issues and build on its "comparative advantages" in facilitating partnerships. These new focus areas were approved by USAID/W in April 2004. In the Final Planning Parameters Cable,[3] RDM/A received the following guidance to help it prepare a new strategy and revised program description for the FY 2005-2009 period:

- The Strategic Objective should continue to reflect the Mission's commitment to critical development priorities, including the Presidential Initiatives *Water for the Poor* and *Global Climate Change;*
- In preparing the revised program description, RDM/A may also wish to consider and describe the health impacts of the US-AEP Program;
- USAID/W approves the overall conceptual approach for the revised US-AEP Strategic Objective "Cleaner Air and Water for Asian Cities;"
- Environmental governance should be an integral, cross-cutting theme.

Under the Environmental Policy and Institutional Strengthening IQC (EPIQ II), International Resources Group (IRG)[4] has been tasked to assist US-AEP in preparing the new five-year strategy. The key deliverables requested from IRG by US-AEP include this document – the ***Strategic Assessment Report*** – and a second document provided under separate cover – the ***Strategic Objective Plan***.

In preparing the Strategic Assessment Report, IRG conducted consultations in the US, visited the six current US-AEP countries (India, Indonesia, Philippines, Sri Lanka, Thailand, and Vietnam), as well as Bangladesh and Laos, and conducted telephone and email interviews with experts in Cambodia, China, Nepal, and Pakistan. The Assessment Team also reviewed a large volume of reports and documents related to environmental problems in Asia, current USAID and US-AEP programs, and assistance programs executed by other bilateral and multilateral donors.[5]

1.3 Outline of the Report

The *Strategic Assessment Report* presents the findings of IRG's team and has been structured to answer the following questions:

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[2] Op. cit.

[3] US Department of State, *Final Planning Parameters Cable,* April 29, 2004.

[4] The IRG team included: IRG Staff, Glen Anderson (Team Leader) and Leticia Orti (Management Specialist); and IRG consultants, John Core (Air Quality Specialist), Jeffrey Jacobs (Water Management Specialist), Robert Kenson (Air Quality Specialist), Frank Peacock (Water Management Specialist), and Whitney Sims (Administrative Specialist).

[5] Lists of all institutions and individuals consulted and documents reviewed are provided as attachments to this report.

- What are the key development challenges in urban air, water, and environmental governance?
- What are the best opportunities for US-AEP to address these development challenges?
- What is rationale for a regional US-AEP program?
- What types of partnerships will be needed in the new US-AEP program?

The remainder of the report is divided into four sections. Section 2 provides a region-wide synthesis of the development challenges for urban air, water, and governance. Section 2 and Annex 1 - which provides a summary of the key environmental issues for each of the Asian countries included in the assessment – are designed to help US-AEP better focus its regional strategy in countries of opportunity and identify and target interventions.

Section 3 provides an overview of current assistance programs in Asia, in the areas of urban air, water, and governance. The first part of this section summarizes US-AEP activities that are directly related to urban air, water, and governance. The remainder of the section describes multilateral donor programs, including those of the World Bank and the Asian Development Bank, and multi-donor regional initiatives. Other bilateral donor programs are noted in the discussion of regional initiatives, where appropriate.

2 DEVELOPMENT CHALLENGES: REGION-WIDE SYNTHESIS

Why focus on urban development challenges? The Concept Paper proposes US-AEP concentrate its program resources on urban problems. Rural populations suffer from many of the same water and air-related diseases and illnesses as residents in cities. While the incidence of illness and death associated with indoor air pollution is significant in rural areas, where dung and biomass are used for cooking and heating and access to water and sanitation is limited, a case can be made for an urban focus.

In the next 20 years, the population of the region will grow by more than one billion people – with virtually all of Asia's population growth concentrated in cities.[6] As shown in the map below, the urbanization of Asia is faster than urbanization of any other world region. The consequences of this urbanization will be the rapid growth of mega-cities, as shown in Table 2-1. Many of these major Asian cities will reach populations of 15 to 20 million people within the next ten years.

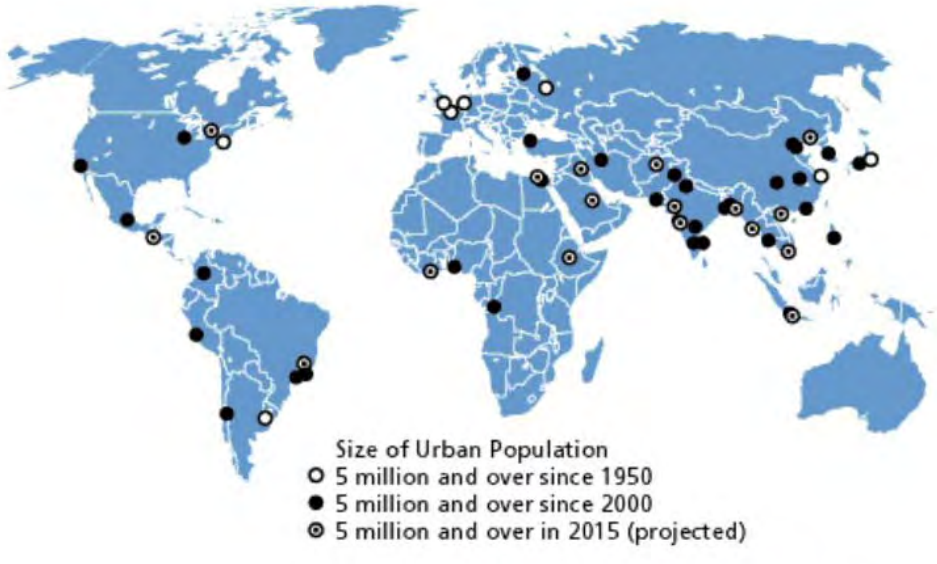
In addition to an increasing number of urban residents, rural-urban migration plays an important role in city growth. Such migration trends are stimulated by the inability of the rural population to sustain economic livelihoods in rural areas. Throughout Asia, cultivatable land has been exhausted. Many of the rural population are forced to farm on one hectare or less and the number of landless squatters continues to rise. For many, the only option is to move to urban areas in the hope of finding work, if they are to feed their families.

In Asia's cities, it is mainly low-income groups living in informal settlements who suffer poor health and unstable finances resulting from inadequate public services, such as poor water quality, lack of sanitation, and air pollution. Ultimately, the health of the urban poor is worse than their rural counterparts – infant mortality rates are higher and children are more likely to be underweight and malnourished. Lack of sanitation, coupled with a dense urban population, leads to polluted surface and groundwater resources. Most new arrivals from rural areas are absorbed by these informal settlements, only to face similar circumstances.[7]

[6] United Nations, *The World Urbanization Prospect*, 1999 revision.

[7] According to UN-Habitat's report *The Challenges of Slums: Global Report on Human Settlements 2003,* over 78% of the urban populations in the Least Developed Countries live in slums. In Asia, 45% of the urban population in 2001 lived in slums (UN-Habitat, *Slums of the World: The Face of Urban Poverty in the New Millennium?,* 2003)

Figure 2-1: Urbanization



Source: United Nations, World Urbanization Prospects, The 1999 Revision.

Table 2-1: Projected Urban Growth – South and Southeast Asia

	1995	2015
Mumbai (Bombay)	15.1	26.2
Kolkata (Calcutta)	11.9	17.3
Delhi	9.9	16.9
Karachi	9.7	19.4
Metro Manila	9.3	14.7
Jakarta	8.6	12.9
Dhaka	8.6	19.5
Bangkok Metropolitan Region (BMR)	7.6	10.1

Source: United Nations Population Division. Urban Agglomerations 1950-2015

Urban growth also will result in commensurate increases in motorization[8] and energy consumption, both of which will adversely affect urban air quality and substantially increase greenhouse gas (GHG) emissions throughout the region.

2.1 Air Quality

In most Asian cities, air quality is declining as a result of increased emissions associated with motorization, industrialization, and urban population growth. Deteriorated air quality has a profound

[8] There are 500 additional cars on the roads each day in Bangkok and 400 daily in Chennai.

effect on health, resulting in premature death, acute and chronic illness, and significant economic ramifications due to lost work and increased healthcare costs.

The major pollutant of concern throughout Asia is particulate matter (TSP or SPM) and/or PM-10 and PM-2.5.[9] Levels of PM-10 are very high and rising, usually exceeding USEPA and WHO Ambient Air Quality Standards established to protect public health. The estimated effect on human health of air pollution associated with PM-10 is shown for select Asian cities in Table 2-2.

Table 2-2: Urban Air Quality Impacts

City[10]	Year	Chronic Bronchitis Cases	Deaths Associated with PM-10	Annual Costs ($ million)
Manila	2001	8,439	1,915	$392
Shanghi	2000	15,188	7,261	$880
Bangkok	2000	1,092	4,550	$424
India (25 cities)	--	--	--	$14-$191/city
Jakarta	2002	--	--	$100

Source: *CAI-Asia, A Strategic Framework for Air Quality Management in Asia*, 2004

In addition to particulates, there are a number of other pollutants of concern in urban areas, including ground-level ozone and carbon monoxide, which are mainly associated with increased morbidity, and a group of pollutants that are either carcinogenic or highly toxic: polycyclic aromatic hydrocarbons such as benzopyrene and heavy metals such as lead and chromium.

While everyone in the city suffers from air pollution, low income residents can be affected more than higher income groups because of a combination of factors: proximity to heavy road traffic and industry, open burning of solid waste in their communities, and indoor air pollution associated with the burning of biomass for cooking and heating. Air pollution generated by cities can also have transboundary and global impacts – a portion of airborne mercury observed in the US might have originated in Asia or other regions of the world, and the vehicles, industry, and power plants burning fossil fuels contribute greenhouse gases.

USEPA and WHO guidance on "safe" levels of ambient air quality stress the importance of meeting 1-hour, 8-hour, or 24-hour standards because of the strong correlation between short-term exposure and acute illness. Thus, annual air pollution levels estimated on an annual basis may have little bearing on pollution-related illnesses. For example, New Delhi has achieved annual reductions in particulates, but still exceeds the standards for TSP and PM-10. In most cities in the countries covered by this report, it is difficult to accurately assess the extent of the air pollution problem because of limited capabilities to

[9] This was raised as an issue in every one of the countries visited by the team, with the exception of Lao PDR.

[10] Sources: World Bank, *Philippines Environment Monitor, 2002*. Washington, DC.
Chet, et.al. *Integrated Risk Assessment of Human Health and Energy Options in Shanghi*.2002
World Bank. *Thailand Environment Monitor, 2002*. Washington, DC
Mashelkar Committee. *India Fuel Policy Report*. August 2002.

monitor ambient air quality. Even in those cities with adequate monitoring networks, many of the pollutants of concern are not monitored on a frequent or continuous basis.

To improve urban air quality, the basic challenge is to control emissions from mobile, stationary, and area sources within urban environments and in areas from which pollutants may be transported. To meet this challenge, authorities in urban areas must establish appropriate policies to reduce emissions. Air quality managers must have a thorough understanding of the sources of emissions, their relationship to ambient concentrations, how these sources are affected by emission controls, and other contributing factors. Also of critical importance is the capacity of city authorities to monitor and enforce air quality regulations and policies.

Evaluations of air quality management (AQM) programs in Asia have recently been completed by the Clean Air Initiative for Asian Cities (CAI-Asia) working in cooperation with other donors.[11] The CAI-Asia Strategic Framework report is a broad, high-level evaluation that provides recommendations for key components of the AQM systems in Asia. In summary, the report concludes:

> *AQM challenges in Asia range from a lack of government commitment and stakeholder participation, weaknesses in policies, standards and regulations, through to deficiencies in data on emissions, air quality and impacts on human health and the environment. Emission inventories are often absent, incomplete or inaccurate. Emissions standards are sometimes obsolete and do not reflect best technical practice. Measures to prevent and reduce air emissions are often hampered by lack of source apportionment. Low-cost and effective alternative technologies are rarely available. Outdoor air quality monitoring systems are often limited in spatial coverage, are not harmonized or are absent altogether. Trans-boundary air pollution is rarely monitored.*
>
> *The lack of quality assurance/quality control procedures means that data quality is often unknown, or poor. In many Asian countries insufficient information exists on the health, environmental and economic impacts of air pollution. Risk perception, risk communication, information dissemination and awareness raising are often issues to be addressed. The relatively low priority of AQM means that funding is often a problem. Key barriers to the adoption and implementation of the Strategic Framework include lack of political will, inadequate infrastructure, lack of reliable data for emissions and air quality monitoring and poor surveillance of health impacts caused by air pollution.*

In a report presented by CAI-Asia in Bangkok in June 2004, the Secretariat largely concurred with the findings presented in the ***Strategic Framework for AQM in Asia***, noting that the weakest link in AQM in Asia was air quality, made evident by a complete absence of emission inventories that are needed to identify contributing sources, support modeling, track emission trends, and evaluate the effectiveness of control strategies.

[11] CAI-Asia is an initiative that is the focal point of the assistance efforts of many donors to address urban air quality throughout Asia. It was mentioned favorably in consultations in Thailand (which also hosts the CAI-Asia CATNET training program), the Philippines and Vietnam.

The World Bank's March 2003 report on air quality in South Asia concluded that uncertainties in the quality of air monitoring data throughout the region and a weak understanding of the sources of air pollution in many Asian countries were major pitfalls to effective air quality management.

CAI-Asia has recently completed an inventory of initiatives and organizations working in Asia, identifying some 155 AQM projects, most of which deal with local air pollution issues, including ambient air monitoring, mobile and stationary sources, or GHG abatement. The authors conclude that since there is no established database of programs and projects, there is duplication of efforts. In addition, although the projects have produced a substantial body of knowledge, results are not well-documented, shared or fully utilized in the formation of AQM policy and practices, and skills from special projects are not transferred to regulatory agencies.

The findings from IRG's consultations in Asia are consistent with those recently completed by CAI-Asia Secretariat, ADB and the World Bank. The greatest development challenges in the urban air sector include the prevention of further air quality deterioration that will likely result from increased motorization and urbanization of mega-cities within the region. The consultations underscored the lack of air quality and transportation management planning required to meet this challenge. Understandably, the current focus of interventions in all of the countries visited was on the important and immediate need to reduce emissions from motor vehicles, with little or no emphasis on air quality planning.

2.1.1 AIR QUALITY PLANNING

Air quality planning is a multi-stage process involving the characterization of current emissions and emission trends, modeling of emissions dispersion patterns and resulting ambient concentrations, and identification and assessment of policy options for reducing emissions to achieve target levels of ambient air quality. In the team's consultations, the emissions inventory was highlighted as the Achilles' heel of air quality planning – without an accurate emissions inventory, the analyses in later stages of planning would not be reliable or credible with policymakers or the public.

A presentation at the Better Air Quality 2003 Workshop[12] in Manila indicated that there has been recent progress in preparing emission inventories in Asian cities, but these efforts are flawed in a few significant areas:

- Level of detail and degree of disaggregation varies greatly across cities – the lack of a common methodology complicates the task of air quality modeling and determining the impacts of policies;
- Questions have been raised about the reliability of activity data and emission factors, with large error margins resulting because of explicit assumptions about maintenance and operation of vehicles and process technologies;[13]

[12] Cornie Huizenga, CAI-Asia Secretariat. *First Coordination Meeting of Regional Air Quality Initiatives and Programs in Asia.* June 16, 2004. Bangkok, Thailand.

- Many of the inventories have been conducted by outside groups, a missed opportunity to build capacity within air quality management agencies.

There is a poor understanding of the sources of air pollution beyond (and sometimes even within) the mobile sources sector. However, some progress in building capacity and producing a credible emissions inventory was noted in the team's consultations at the US-AEP India Country Office in Delhi and the US-AEP Mumbai Office. The USEPA-Pune Regional Emission Inventory Study represents an important step in the air quality planning process, as it has identified several major contributing sources that were previously unknown.[14] This was an innovative, cooperative, and highly successful effort to demonstrate emission inventory techniques in Asia. The software and methods developed during the Pune work will be replicated in Mumbai, Kolkata and other Asian countries in the future. Significantly, new source apportionment studies are identifying the importance of re-suspended road dust, vegetative burning, and other sources to PM-10 levels in Asia.

Some progress has been made in monitoring air quality in the region, although not in most of the cities the assessment team visited. According to CAI-Asia, several cities have set up continuous air quality monitoring stations, including Bangkok, Ho Chi Minh City, Kolkata, Manila, and Surabaya.[15] In most cases, these stations are not linked as a network and do not measure ozone or fine particulate matter.

2.1.2 EMISSION REDUCTION POLICIES

In the countries assessed, cities, and in some cases, countries, are making progress in addressing emission levels. The greatest air quality success has been the phase-out of leaded gasoline in most countries. This measure not only reduces lead emissions, but also is a critical step in introducing stricter vehicle emission standards that can only be achieved by vehicles fitted with catalytic converters and fueled with unleaded gasoline.

Vehicle emission standards can be an effective mechanism for reducing mobile source emissions, if properly enforced. Most countries have committed to these standards. In some countries, stricter standards will be phased in over several years. However, to meet these stricter standards, vehicles must use modern emissions control systems, which are costly to retrofit to older vehicles. As a result, the stricter standards apply only to new vehicles. Because of the sluggish retirement of older, high pollution vehicles and the pervasive practice of importing second-hand vehicles (or engines), stricter emission standards will not have an immediate effect.

Diesel emissions are a significant source of particulate matter and their reduction has been a challenge throughout Asia. India's leading environmental NGO, Center for Science and Environment (CSE),

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[13] In the Assessment Team's discussions with Dr. Supat Wangwongwatana, Deputy Director General, Pollution Control Department, MoNRE, in Thailand, he raised a similar point about the need to develop emission factors appropriate for cities in South and Southeast Asia.

[14] Round Table Meeting in Mumbai, July 19, 2004.

[15] Cornie Huizenga, CAI-Asia Secretariat, *First Coordination Meeting of Regional Air Quality Initiatives and Programs in Asia,* June 16, 2004, Bangkok, Thailand.

succeeded in obtaining a court-mandated change-over of diesel buses to CNG fuels. These actions have spurred interest in alternative fuels throughout Asia.[16] The change over from diesel to CNG can significantly reduce emissions from diesel vehicles. However, the retail pricing of CNG (and gasoline) compared to diesel (due to differentiated taxation in South Asia), promotes fuel switching between gasoline and CNG, but not between diesel and CNG. Moreover, diesel technology is robust, and experience with heavy-duty vehicles switching to CNG (buses being the most common example) shows that maintenance costs tend to increase. The greater maintenance difficulties of CNG vehicles compared to diesel means that fleet operators must be strongly committed to CNG, provide the necessary staff training, and cover the incremental costs. Clean fuels are required to assure that air quality in Asia is not further deteriorated by urbanization and is therefore an important development challenge.

Another major cause of pollution is the emissions from 2-stroke engines typically found in small motorcycles and 3-wheeled taxis. Visible emissions, CO and hydrocarbon emissions are of great concern in Hanoi, Jakarta, Manila and many other major cities. Outreach efforts to drivers and mechanics urging the use of smokeless lubricants, premixed oil-petrol fuels, efforts to restrict the number of vehicles allowed on the streets during specific times, and demonstration projects to encourage changeover to 4-stroke (or CNG) engines have all met with limited success.

The Assessment Team's consultations focused mainly on mobile sources of pollution and policies to reduce them directly through technical controls or fuel quality improvements or substitutions. Interviewees acknowledged the long-term role of urban transportation policies and highlighted some efforts to address congestion and encourage the use of public transportation options to reduce emissions and energy consumption, important initiatives in a GHG mitigation strategy. In general, the challenges in tackling the transportation conundrum were viewed as too overwhelming for US-AEP.

In a few consultations, interviewees also addressed the difficulties of reducing stationary and area emission sources. While there are emission standards in most countries, they are seldom enforced except among the large industrial facilities. Small and medium enterprises are largely unregulated and regulatory agencies often lack appropriate tools such as penalties and fines to discourage non-compliance. In consultations in Delhi, it was noted that the only enforcement tool available the Central and State Pollution Control Departments to address non-compliance is facility closure.

2.1.3 INSTITUTIONAL CAPACITY

In all of the team's consultations, a lack of institutional capacity to plan and manage air quality was highlighted as a major barrier. The problems mostly relate to understaffing, gaps in technical and enforcement skills of staff, and inadequate funding to operate air quality monitoring networks. In many cases, management responsibilities have been devolved to local agencies, but without concomitant authority to self-finance these management activities.

[16]The possibility of funding an NGO to sue government was raised in the Sri Lanka Meeting on July 22, 2004 at the Ministry of Transport in Colombo.

Universally, motor vehicle inspection and maintenance (I&M) programs throughout Asia (and in other regions of the world as well) have been ineffective. In Manila, DENR has registered some 400 independently owned inspection stations. A survey of 500 vehicles that "passed" inspection found that only 25 vehicles had been actually "tested." Such stories are common. India's Clean Up Pollution (CUP) system, Bangkok's vehicle inspection program, the Bangladesh I&M and others are failures.[17] Without effective I&M, it will be extremely difficult to control in-use vehicle emissions, especially those that are "gross emitters." There is debate as to whether it is possible to mount an effective I&M program in Asia in the near future.[18]

2.1.4 PUBLIC AWARENESS

A key development challenge throughout Asia is the public's poor understanding of urban air pollution issues, its responsibilities to minimize emissions, and its right to clean air. As a result, the public takes little personal responsibility to reduce the problem and political leaders place a low priority on dealing with urban air pollution. Lack of awareness adds to the ineffectiveness of vehicle inspection programs and weakens public support for regulatory action, resulting in poor governance. Promoting clean air within the public and political sectors is essential for success, as demonstrated during the efforts to ban leaded fuels throughout Asia.

2.1.5 CONCLUSION

There has been some progress in improving air quality in Bangkok, Delhi, Katmandu, and Dhaka. In every case, the banning or reduction of 2-stroke engines has been instrumental in this effort, although both Bangkok and Delhi have gone much further in reducing mobile sources of emissions.[19]

The IRG Strategic Assessment of urban air quality in Asia is consistent with the findings of other organizations. There is little question that the issue of good governance is key to meeting the future urban air development challenges. In the technical area, the most consistent need is for an improved, very basic understanding of the air quality and transportation planning in Asia, specifically in the emission inventory development and air quality monitoring fields. An inadequate or incomplete understanding of the sources of air pollution and existing air quality conditions results in misunderstanding about how to improve air quality and action plans that only address some sectors of the problem: most notably mobile sources. Other important challenges include diesel emissions and

[17] It became clear during consultations in each of these countries that I&M of vehicles had failed to achieve any improvement in vehicle emissions. In every case this was because emission certificates were obtainable by payment with no inspection having taken place.

[18] A recent presentation for USAID by PA Government Services, *Vehicle Inspection and Maintenance Programs: International Experience and Best Practices,* September 23, 2004, reinforces the findings of the Assessment Team and concludes that the timing is not yet "ripe" for a major effort on I&M.

[19] Team members who had long-term familiarity with Delhi, Bangkok, and Dhaka attested to the visibly improved air quality in these cities compared to five to ten years ago.

fuels,[20] 2-stroke engines, I&M, fuel adulteration, and public awareness. If these governance and technical challenges are not addressed, future urbanization and motorization of Asia will further deteriorate urban air quality and further increase mortality and morbidity throughout Asia.

2.2 Water

Poor access to clean water and safe sanitation is one of the major problems facing Asia. Sixty-three percent of the population of Asia does not have access to clean water and 80% are without access to sanitation. None of the countries in which US-AEP is currently operating provide all of their urban population with a supply of clean drinking water.[21] Within South Asia the common model is that of an interrupted flow of water, rather than continuous service (24 hours a day, seven days a week); unlimited accessibility to water is generally confined to the more affluent and influential sections of the urban area. In Southeast Asia there is more likely to be more continuous supply, but only to parts of the urban areas. Large areas of the cities are not supplied with municipal water and people rely on purchasing water from small scale water providers (SSWPs). In the six US-AEP countries, even where water is supplied, none of the urban areas provide piped water that meets minimum acceptable drinking water standards.

Infant mortality rates are 10 to 20 times higher in cities without adequate water and sanitation. In Asia, diarrheal diseases account for 18% of infant mortality while malaria and HIV/AIDs only account for 2% and 1%, respectively. Poor water quality and limited access to piped water have significant economic growth implications for urban areas. These problems may affect location decisions of industries and limit opportunities for small businesses to operate in urban areas without access to water.

The urban water situation is getting worse. Most urban water authorities are in a slow, downward spiral as years of neglected maintenance reduce the effectiveness of the existing systems. Systems that cannot meet existing needs are going to face a rapidly growing demand for water in the coming years; a demand that, under existing circumstances, they are incapable of meeting.

2.2.1 COPING WITH INADEQUATE WATER SUPPLY

The Millennium Development Goal (MDG) for water access commits the global community to reduce by half the proportion of people without sustainable access to safe drinking water by 2015. Since 1990, Asian countries have made considerable progress in providing the public with improved water resources. As indicated in Table 2-3, although a large proportion of the urban population has improved access, it is important to note that this access is not by piped connection. Some of the "improved" access options may require a considerable investment of time by the poor to gather water, especially if the source is not served or capable of supplying continuous water. Family members may spend a significant amount time queuing at wells or standpipes and require several trips to meet their needs.

[20] Of the countries visited, only Delhi in India has addressed the problem of diesel emissions.

[21] In none of the countries visited were local people advised to only drink tap water that has been purified. For low income households, the cost of additional purification such as boiling or filtering may be prohibitive.

In South Asia, even where there is access, water is most likely to be available only on an intermittent basis a few hours a day – or in some cases, for a few hours every two or three days. This limited availability engenders water capture strategies that undermine the distribution system and can adversely affect the quality of piped water. With a pump to draw the water out of the system quickly (and by doing so, reducing water pressure elsewhere), and a tank to store the water in, higher income households can ensure a *de facto* continuous supply. If necessary, they can also put in tube wells and pumps to supplement the municipal supply, buy water from tankers to top up the tanks, and purchase bottled drinking water. By such expenditures they ensure that there is water available to them around the clock. However, the cost is well above what one would pay for a well-managed, constant supply of municipal water.

For the poor, pumps and tanks are not options they can afford. In addition, the areas they live in are likely to be the worst affected by intermittent supply and low water pressures. In Delhi, for example, the standpipes on which many of the poor depend, generally supply water for about four hours a day. With each standpipe supplying around 500 families,[22] and water pressure often low, filling of containers is a slow business; those who arrive in line late often find that they do not reach the water supply at all.

Table 2-3: Urban Access to Drinking Water (% urban population)

Country	1990		2002	
	Improved Access[1]	Piped Connection	Improved Access	Piped Connection
Bangladesh	83%	28%	82%	26%
Cambodia	-	-	58%	31%
China	100%	80%	92%	91%
India	88%	51%	96%	51%
Indonesia	92%	26%	89%	31%
Laos	-	-	66%	25%
Nepal	94%	42%	93%	48%
Pakistan	95%	61%	95%	50%
Philippines	93%	37%	90%	60%
Sri Lanka	91%	37%	99%	35%
Thailand	87%	69%	95%	80%
Vietnam	93%	51%	93%	51%

Source: WHO and UNICEF, Meeting the MDG Drinking Water and Sanitation Target – A Mid-term Assessment of Progress, 2004

[1] Improved access to water is achieved by household connection, public standpipe, borehole, protected dug well, protected spring, and rainwater collection

To ensure that they receive water, many arrive early and then spend a great deal of time in the queue waiting to collect water. In some areas, however, the water supply is only turned on at night or early morning; this is a burden that is disproportionately borne by women and girls who are responsible for water collection. In Chennai, where there is an acute problem, the team heard stories of women losing

[22] ADB, Asian Water Supplies – Reaching the Urban Poor. ADB, Manila 2003,

wage paying jobs in order to spend the day standing in line for water.[23] Girls forced to stand in line often give up valuable school time.

In Southeast Asia the water supply is often intermittent, but generally not to the extent that it is in South Asia. The problem in countries such as the Philippines and Indonesia is that large urban areas, at times, have no municipal supply of water. These are the circumstances which cause people to purchase water from small scale water providers (SSWPs). This water is not inexpensive, especially in comparison to piped water. In Manila, around five million people obtain water from SSWPs at an average cost per month of US$10-$20, based on household consumption rate of 6 m^3 per month. Households with piped connections are paying less than half as much (US$3 to $6) as other residents, but receiving five times as much water (30 m^3 per month). So the poor in the Philippines are paying 12 to 30 times as much for a cubic meter of water as connected households. In the Philippines, water expenditures may account for 10% of household expenses.[24] The poor in the Philippines are relatively well-off compared to the urban poor in Jakarta. Interviewees reported that the poor may spend as much as 30% of their income to purchase water, often at prices that are 50 to 90 times the cost of piped water.[25]

A common perception in the development community is that tariff increases for water supplies will impact unfairly on the poor. The reality is that the poor in Asia are already paying dearly for water, either in terms of the opportunity cost for valuable time lost, or in terms of the real cost of payment to SSWPs. A piped supply of municipal water would, at almost any tariff, decrease the price, as well as increase the quantity available for the poor.

2.2.2 WATER SANITATION AND HEALTH

The MDG for sanitation is comparable to the goal for drinking water – to halve the population lacking basic sanitation by 2015. Table 2-4 shows the trends in urban access to sanitation between 1990 and 2002. In comparison to water access, smaller advances were made between 1990 and 2002 in improving access to sanitation. When urban population growth is taken into account, the number of urban poor without safe sanitation has actually increased, not decreased as the statistics would suggest.

In many urban areas of Asia, lack of access means that even the most rudimentary contained sanitation facilities are absent. Overhung latrines, where excretion is discharged directly to a water body, bucket latrines, and defecation on barren ground are all common options for poor urban residents. Effective public health measures require that human waste be removed and treated in areas where hundreds of thousands of people are densely packed. A sewerage system is the most feasible way of doing this. Slums located at the edges of cities, where population densities are less, might be eligible for other measures involving local disposal. What is clear is that there is a need for explicit government policies on urban sanitation, specifically addressing the needs of slum areas.

[23] Meeting in Chennai July 19, 2004 with the Tamil Nadu Urban Infrastructure Commercial Services.

[24] ADB, Asian Water Supplies – Reaching the Urban Poor. ADB, Manila 2003,

[25] Meeting at the World Bank Water and Sanitation Program, August 6, 2004.

The statistics on sanitation access are misleading – suggesting that the sanitation problem has been adequately solved for those with access. In fact, access focuses on the facility, not on the ultimate disposal and treatment of human waste. In Bangkok, for example, virtually the entire city relies on septic systems with few businesses and household connected to sewers. These septic tanks are generally not desludged until they back up or overflow; when they are desludged, the sludge is frequently disposed of in the nearest convenient landfill or dumped in a watercourse. The result is that both ground and surface water in Bangkok is heavily contaminated with fecal coliform. Bangkok is not alone - virtually every major city in South and Southeast Asia relies upon septic systems for most of their sanitation, and all share the same problem as Bangkok. In fact, only 30% of the populations of Asian cities have access to sewage.

Both inadequate water supply, and water that does not meet acceptable quality standards, has a huge health impact. A supply of clean piped water and adequate sanitation would be the most important public health measure that could be implemented in Asia. Diarrheal diseases kill six times as many infants as HIV/AIDS and malaria combined. Cholera and typhoid epidemics kill both young and old. At the time of the IRG team's visit to India, cholera had just broken out in Delhi, with 945 reported cases as of June 2004.[26]

Table 2-4: Urban Access to Sanitation[1] (% of population)

Country	1990	2002
Bangladesh	71%	75%
Cambodia	-	53%
China	64%	69%
India	43%	58%
Indonesia	66%	71%
Laos	-	61%
Nepal	62%	68%
Pakistan	81%	92%
Philippines	63%	81%
Sri Lanka	89%	98%
Thailand	95%	97%
Vietnam	46%	84%

Source: WHO and UNICEF, Meeting the MDG Drinking Water and Sanitation Target – A Mid-term Assessment of Progress, 2004

[1] Improved access to sanitation is achieved by: connection to a public sewer, connection to a septic tank, pour-flush latrine, ventilated improved pit latrine, and some categories of pit latrines

Table 2-5 shows some of the major water and sanitation diseases that impact on the urban areas of Asia. It is not just the lack of available drinking water that causes health problems. The shortage of water for bathing and sanitation is also a major health issue, especially among the poor. Within the poor population, those most affected are babies and infants followed by women.

[26] Times of India. July 21, 2004.

As South and Southeastern Asian cities, particularly the slums, grow ever larger, the incidence of disease will rise unless measures are undertaken to address the issues of water and sanitation in order to improve morbidity and mortality rates.

Table 2-5: Common Water and Sanitation Related Diseases in Asia

Disease	Description
Diarrhea	Caused by micro-organisms including viruses, bacteria, and protozoas. About 4 billion cases a year cause 2.2 million deaths. 1.8 million of these deaths are children under 5. This is the most common cause of infant death in South and Southeast Asia.
Arsenicosis	Long-term exposure to low concentrations of arsenic in water causes skin keratosis and cancer of the skin, lungs, bladder and kidneys. Water supplies in West Bengal, Bangladesh and parts of Vietnam are contaminated with arsenic.
Cholera	An acute bacterial infection that can quickly lead to dehydration and death. In 2002, over 120,000 cases were reported worldwide.
Fluorosis	A serious bone disease that is endemic in at least 25 countries, including India and Pakistan.
Intestinal Worms	Parasitic worms also known as helminthes that spread through contact with soil contaminated with human feces or from contaminated food. Ten percent of the developing world's population is infected. Severe infection leads to malnutrition and can lead to anemia or retarded growth. Common throughout Asia.
Malaria	Each year there are 300 to 500 million cases of malaria and about 1 million child deaths. Standing water produces the breeding ground for the mosquitoes that carry the infection. All US-AEP countries have areas of malarial infection.
Trachoma	An eye infection spread by poor hygiene caused by a lack of adequate water supplies and unsafe environmental sanitation conditions. Children are particularly susceptible. About 6 million people are blind today because of trachoma.
Typhoid	A bacterial infection caused by ingesting contaminated food or water. About 12 million people are affected by typhoid each year. Common throughout the region.

UNICEF, Water Environment and Sanitation Website

2.2.3 THE PROBLEM

Every Asian country has committed to the Millennium Development Goals, including sustainable access to safe drinking water. However, this commitment has not been reinforced by the preparation of action plans or programs designed to increase access – in fact, countries have committed to the goals but have not yet considered the changes that would be needed in policy, other enabling conditions, and institutional capacity, or looked closely at the financial requirements to increase access, particularly for the poor. Worldwide, there is a huge financing gap in water: $70 billion is spent annually, but $170 billion is needed.

2.2.4 GOVERNANCE

Governance is a large part of the problem. At a national level, governments make regulations that impact on water supply, such as regulations governing water tariffs, but have no responsibility for the water supply itself; this responsibility resides with provincial and municipal level government and water supply entities. So the local supplier of water may well have no control over the tariff they are able to charge for the water.

Surprisingly, one area over which there is no regulation is water quality where there are seldom any standards set for the water at point of delivery – in other words, the supplier has no enforceable legal obligation to deliver water that is actually fit to drink. This can result in perverse incentive structures for water suppliers. For example, to meet their contractual requirements for water quantity, interviewees reported that the two water concessionaires in Jakarta are mixing canal water with the raw water supply in low flow periods.[27] This canal water is only of slightly higher quality than diluted sewage.

Although municipal governments and local authorities are the ostensible suppliers of urban water, they do not have a mandate to supply potable water to the entire urban population. In fact, regulation might actually prohibit them from doing so. For example, on occasion, authorities are prohibited from supplying water connections or sanitation to informal settlements in the urban area. The rationale often provided for denying access is that a piped connection confers legal recognition to essentially illegal settlements. This, of course, directly restricts access to water and sanitation for the poor who usually occupy these settlements. In addition, officials have expressed the view that the provision of piped water would accelerate rural-urban migration, when in fact the number of urban poor without access is many times the incremental number of rural households that might respond to this incentive. Another effective barrier can be the cost of connection – in Manila and Colombo, first-time connection charges are $107 and $129, a substantial share of a low-income household's annual budget. [28]

Within Asia, the water supply authority is almost always managed as an extension of local government with civil service rules and salaries and staffing levels. A water supply authority is a business, and in some cases a very large one (e.g., the Delhi Jal Board employs 27,000 staff). In discussions with the Delhi Jal Board, their managers indicated that despite the large number of employees, they lack basic strategic planning, technical, and financial skills needed for effective performance. Supplying water to 15 to 20 million people is a huge undertaking requiring an effectively managed and staffed organization.

2.2.5 PARTICIPATION AND AWARENESS

There is seldom public input into the provision of water in urban areas. Consumers who suffer the most from the inadequacy of the service – the urban poor – are not organized to press for improvements and may not be afforded an avenue by government or utilities. While there is a large, visible, and effective

[27]Reported in consultation with PERPAMSI and BAPPENAS in Jakarta August 9, 2004. PT PAM Lyonnaise Jaya (Palyja) serves West Jakarta and PT Thames Pam Jaya (TPJ) serves East Jakarta. See consultation notes at Annex 2.

[28]Asian Development Bank, Water in Asian Cities. *Utilities' Performance and Civil Society Views*, ADB. 2004.

lobby for control of vehicle emissions in some cities, there is little public outcry or articulated demand for the provision of clean water.[29]

In part, urban residents appear to accept the inadequate provision of water and its poor quality. One interviewee in Thailand noted that from a young age, residents have relied on bottled water for drinking purposes. There appears to be limited awareness of the quality of drinking water or the public health issues associated with unsafe water and sanitation services.

2.2.6 WATER SOURCES

One of the consequences of the increasing urbanization in Asia, frequently coupled with increasing industrialization, as both human settlements and industry expand, is the pollution of urban water at its source.[30] In fact, the water quality can become so poor that it is not even acceptable for treatment at drinking water treatment plants. A further cause of urban water pollution is the growth of rural agriculture which, upstream of intakes, pollutes water sources with runoff from animal waste, fertilizer and pesticides. Additionally, deforestation or overgrazing of watersheds can denude vegetation causing fluctuations in both water quantity and water quality – increasing the turbidity and flows of water during the wet season[31]and decreasing the flows in the dry season. All of these factors can lead to an effective decrease in the amount of available water at the source.

The lack of sanitation also impacts on potential water supply, as it leads to groundwater and surface water pollution.[32] In none of the countries visited was there any effective means of treating wastewater or desludging septic systems and disposing of the sludge. Typically, sewers discharge directly into rivers, canals, and lakes, and sewage is dumped wherever possible, frequently directly into water bodies.[33]

2.2.7 THE WATER SUPPLY SYSTEM

Water supply systems require constant maintenance. Without this attention, they deteriorate and eventually collapse. In the six US-AEP countries, water supply systems run the gamut from slow deterioration (Bangkok, Colombo) to imminent collapse (Chennai, Jakarta). In few cities in the countries examined, with the exception of many cities in China and Phnom Penh in Cambodia, is there an ongoing program of maintenance that would keep the system running effectively.

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[29] This was probably one of the biggest surprises for the team. In every country visited there were active NGOs bringing advocacy pressure on Government – or in the case of Delhi, taking government to court – to improve air quality. This NGO advocacy seemed to be entirely lacking with respect to water.

[30] This was identified as a problem in consultations in Mumbai, Chennai, Bangkok, Manila, Dhaka, and Jakarta.

[31] The paradox is that the water supply is reduced in the wet season because the treatment plants slow down to handle the turbidity.

[32] In Dhaka, a city surrounded by rivers, all water sources – both surface and ground – have heavy fecal contamination. Reported in consultations with Dr. Mohamed Mujibur Rahman, University of Engineering and Technology, and members of the National Sanitation Task Force, July 22, 2004.

[33] There was not a country visited that was not dumping untreated sewage into its water courses and, as explained by the Secretary of the DENR in Manila, this is not perceived as a problem by most people. In Vietnam there is no sewage treatment at all in the country.

Water supply systems also require operation at a constant pressure. When the water supply is intermittent, with constant pressure changes as the water is pumped into the system and then drawn down, it causes a rapid deterioration to joints, which then leak. This not only causes high water losses, but also draws pollutants into the pipes through the leaking joints. At best, these pollutants are mud and soil, at worst, sewage. The effect is that even if water is adequately treated at the plant before distribution, it can degrade in quality before reaching the tap.

The failure to maintain systems is due to a number of factors. First is the lack of commitment and managerial ability to set up and run effective maintenance programs. Second, tariffs are often are so low they do not cover O&M costs. The third problem is the overstaffing of the utilities so that virtually all revenue must cover payroll costs, reducing funding levels for system maintenance and rehabilitation.[34]

2.2.8 NON REVENUE WATER

Non revenue water (NRW) is one of the significant indicators of the effectiveness of management of a water utility. When NRW increases as a proportion of the total amount of water entering the distribution system, it indicates that the utility is losing potential revenues, thereby reducing revenues needed for proper system operations. Effective water utilities such as the Singapore Water Utilities board have reduced NRW to 5%, while NRW is much higher in poorly managed utilities: NRW in Dhaka is 40%; in Jakarta, 50%; in Delhi and Colombo, 55%; and in Manila, more than 60%.[35]

Non revenue water is created due to several factors. The first is leakage through the system. Poorly maintained pipes leak, many of them visibly at surface level. All water systems leak, those that are well maintained stop the leaks. A system that is poorly managed will face ever mounting losses through leaks; this is the situation in much of South and Southeast Asia. Given that there is a cost to the production of water through its treatment and distribution, the financial viability of the system can only go from bad to worse.

The other sources of NRW include water that is used but not allocated due to inadequate metering or inadequate collection,[36] standpipes where water is freely accessible, and SSWPs who obtain water to sell to their customers without official payment.

Insofar as some of the NRW reaches the poorer parts of the community, a service is being provided, although there is a loss of potential income to the utility.

[34] Kuala Lumpur, a well run utility, has 1.4 staff members per connection. Delhi has 19.9, Dhaka 11.6, Katmandu 15.2, and Vientiane 10.6

[35] Asian Development Bank, *Water in Asian Cities: Utilities' Performance and Civil Society Views*, ADB 2004.

[36] In many Asian countries, one of the "perks" of being in a position of political or bureaucratic influence is ignoring payment of the water bill, with no threat of sanction.

2.2.9 TARIFFS

In all of the US-AEP countries, water tariffs are subject to government approval. In every case there is great reluctance on the part of government to authorize tariff increases. Table 2-6 shows the existing tariffs in some South and Southeast Asian cities. These tariffs are insufficient to cover the running costs of the utilities.

Table 2-6: Water Tariffs per m^3 Selected Asian Cities

City	Tariff
Colombo	$0.22
Delhi£	$0.07
Dhaka	$0.06
Jakarta	$0.29
Katmandu	$0.09
Kuala Lumpur	$0.30
Manila	$0.14
Phnom Penh	$0.24
Vientiane	$0.04

The argument against increasing tariffs often promoted by government and water customers is that the poor cannot afford to pay. In fact, the poor are not connected to water sources; it is the middle- and upper-income households with access to water who benefit from these low, government-subsidized tariffs. As explained above, the poor are paying considerably more for their water. The average water tariff in Europe[37] is US$1.20 to $1.80 m^2. This reflects the price of providing a continuous and reliable water supply of drinking water quality. Costs will be a little lower in Asia, as salary levels are lower.

The tariff needs to be set at a level that enables connection of the urban poor to piped water, but allows the utility to manage for a high level of performance in terms of continuous supply and low rates of NRW.

2.2.10 CONCLUSION

Given the coverage provided to water and sanitation in the Millennium Development Goals, and the ensuing conferences and declarations, it was a surprise to observe how little is actually being done within the US-AEP countries to try to meet the goals. US-AEP has, to this point, been only marginally involved in urban water supply through initiatives such as urban water harvesting in Mumbai and Kolkata.

One of the problems facing any action on urban water supply is that the measures required are not incremental; all of the problems outlined above will need to be resolved in concert in order to turn around a situation that is presently worsening. The problems to be resolved range from the adoption of

[37] ADB, Asian Water Supplies – Reaching the Urban Poor. ADB, Manila 2003.

policies and enactment of legislation to multi-million dollar engineering projects. None of these problems is beyond the ability of the Governments of the countries to resolve if there is political will.[38]

The possibility of tackling the problem is demonstrated by Cambodia, where the Phnom Penh Water Supply Authority managed to take a utility that was as bad as any in Asia and, with the help of the international community, turn it around to make it a model for the region.[39] This has involved a corporatization of the utility; the employment of effective managers – particularly an efficient and inspired chief executive officer; a massive capacity building effort and re-engineering of the system.

2.3 Environmental Governance

The previous sections describe the development challenges that need to be solved in order to achieve desired levels of urban air quality, water and sanitation access, and water quality. While some of these development challenges can be met through increased investments in infrastructure or the implementation of technical solutions, effective and appropriate governance structures are prerequisites for desired change. Thus, whether the new regional US-AEP program addresses urban air and/or water, some of the program's resources will need to be focused on strengthening governance.

In 1960, none of the Asian countries included in this assessment had democratic governments. In 2004, many of these countries have elected governments and are reasonably stable from a political perspective. However, governance structures still lag far behind the more developed countries in Asia, Europe, and North America. Illustratively, 9 of the 12 countries covered by this report (the other three were not rated) ranked from 50 to 94 in the Economic Freedom Ratings in 2002.[40] Thus, development challenges in economic governance can be viewed as part of an overall political and economic pattern faced by Asian countries.

This section provides a synthesis of the key challenges in environmental governance facing Asian countries, with special emphasis placed on urban air and water. Most of these observations are based on the comments of individuals interviewed during consultations, supplemented by information from documents and secondary sources. Governance topics are divided into three parts:

1) ***Enabling conditions*** refer to laws, policies, rules, and regulations that define the roles and responsibilities of implementing authorities and the obligations imposed on individuals, and public and private facilities and institutions;

2) ***Institutional capacity*** refers to the human, physical, and financial resources of implementing agencies and stakeholder groups; and

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[38] … Or financial will. Bangkok, which lacks a functioning sewage system, has just spent $2.75 billion constructing a subway system.

[39] Recounted in ADB, *Asian Water Supplies – Reaching the Urban Poor*. Manila, 2003 and discussed in meetings at the World Bank on July 14, 2004 with Luiz Claudio Tavares, Senior Water and Sanitation Engineer and Task Manager for Phnom Penh Water Supply; and meeting at the Asian Development Bank on August 3, 2004 with Bert van Ommen, Water Team Leader and Francisco Roble Jr., Water Knowledge Management Advisor.

[40] James Gwartney and Robert Lawson, *Economic Freedom of the World 2004 Annual Report,* The Frazier Institute, 2004.

3) ***Public participation*** relates to the involvement of civic society in the formulation and implementation of environmental enabling conditions.

2.3.1 ENABLING CONDITIONS

The key challenges in improving environmental enabling conditions include addressing legislative and regulatory gaps, expanding the level of strategic planning, and clarifying roles and responsibilities for environmental management, particularly between national and regional authorities and between government authorities and environmental service providers.

Legislative and regulatory gaps

All of the Asian countries in the assessment have enacted environmental legislation and promulgated regulations to implement these laws, modeled after similar regulations in the United States, Europe, or Japan. For ambient water and air standards, some Asian countries have adopted World Health Organization guidelines. European vehicle emission standards (e.g., EURO1, EURO2, etc.) have also been adopted by several Asian countries. However, a major gap in environmental regulations has been the implementation of emission and discharge standards for industrial facilities, a prerequisite for compliance monitoring, inspection, and enforcement. Even in countries with standards for large sources, emission and discharge standards have not been promulgated for small- and medium-sized enterprises. In Indonesia, there is no regulation on water quality at the point of delivery, resulting in a perverse set of incentives that lead water concessions in Jakarta to mix polluted canal water with raw water in order to meet contractual obligations for water supply.[41]

A related regulatory gap concerns the lack of provisions for redressing non-compliance with standards and other regulatory requirements. Administrative and criminal penalties and fines, when provided for in regulations, are often very small in comparison to the costs of complying with the standard. In some countries, such as India, environmental authorities cannot levy penalties and have only one legal option available to them – closing down the offending facility. In consultations with Indian industrial associations, it was noted that the government has utilized this option, even in cases where there were no viable options for addressing the violation.

With the exception of India, laws concerning public information, public participation in environmental decision making, and public access to the courts to file grievances against polluters or regulatory agencies are not well developed in the countries assessed. However, some countries are making a concerted effort to close these gaps.

> *Illustratively, in Thailand, a Public Participation Act has been drafted but proponents are currently stymied in efforts to press for enactment because of recent changes in the senior management of the Ministry of Environment and Natural Resources. Thailand has made progress in increasing awareness*

[41] See footnote to paragraph 2.2.5.

> *of environmental issues in the judiciary (US-AEP's Green Bench program), but still lacks legislation establishing standing to sue for NGOs or community groups.*[42]

Strategic Planning

In all the countries the assessment team visited, strategic planning was identified as a current weakness in the environmental arena, specifically for air quality and water. While air quality management plans are vital to identifying and implementing priority policies and actions, they have not been prepared in most countries, in part because there is insufficient data on ambient air quality and emission sources needed to analyze current problems and the potential benefits of proposed changes.

When strategic planning is undertaken, it is usually conducted on a sector-by-sector basis rather than in an integrated way. For example, air quality plans are not coordinated with transportation planning, energy policies, or industrial/economic plans. In water utilities, when they engage in strategic planning, the quantity and quality of the raw water supplied to the utility is an exogenous parameter, with the strategic planning focused on treatment and distribution of water services.

> *In Indonesia, there is little or no work going on to manage the total water resources of Indonesia even though deforestation, contaminated ground water, extensive agriculture use and expanding urban populations will make water supply scarce and adversely affect water quality. By 2010, Jakarta will face serious seasonal shortages of raw water.*[43]

However, in a number of countries, interviewees indicated the need for integrated water management to account for both competing demands for raw water and the quality of water. It was noted that river basin management efforts have been launched in several countries including the Philippines, Thailand, and Vietnam.

Roles and responsibilities for management

Most of the countries in the assessment have, to some extent, decentralized environmental management responsibilities to regional, state, provincial, or local authorities. In many cases, this decentralization has not been accompanied by devolution of financial authority or transfer of resources to adequately fund staff and execute these added responsibilities. In many cases, interviewees noted that national agencies have not anticipated or provided training for sub-national agencies. Fortunately, donors have assisted in building local capacity in many instances.

A related issue concerns the coordination of water tariffs, with water utilities expressing the view that they often are stymied to plan investments and recover costs because they have no control in the setting of tariffs. Water utilities have also encountered difficulties in providing potable water to the entire urban population because they lack the mandate or are prohibited from supplying residents in informal settlements because of land tenure policies. In the case of land tenure, the concern of government

[42] Meeting with Mr. Pongdej Wanichkittikul, Office of the President of the Supreme Court of Thailand, July, 29, 2004.

[43] Meeting with PERPAMSI and BAPPENAS, Jakarta, August 9, 2004.

authorities is that access to water and sanitation will confer legal recognition to essentially illegal settlements, as mentioned in section 2.2.4. This, of course, directly restricts access to water and sanitation services for these communities. In the case of securing potable water, the poor will often spend considerably more on water than wealthier residents or invest considerable time in "harvesting" water. Estimates of the costs of water for the urban poor are 10 to 90 times the costs of water for other urban residents and annual expenditures are as much as one-third of income. In both India and Vietnam, it was noted that water vendors that reap large profits in providing water to informal settlements have lobbied government authorities to maintain access restrictions.[44]

2.3.2 INSTITUTIONAL CAPACITY

In the consultations, limited institutional capacity in national and sub-national environmental agencies and water utilities was the most commonly identified governance issue impeding improved air and water quality and water and sanitation services. Three interrelated capacity issues were noted: lack of human and technical resources, limited skills of staff to carry out responsibilities, and the poor performance of institutions in terms of efficiency, transparency, and accountability.

Institutional Resources

All countries indicated that limited staff resources constrain their ability to carry out compliance monitoring and enforcement activities. Some illustrations from the consultations include the following:[45]

- In Bangladesh, institutional capacity is one of the two most important issues facing the Department of Environment, particularly staff to carry out enforcement activities. GoB efforts to require non-motorized transport to use separate traffic lanes failed due to lack of enforcement.
- In India, the National Pollution Control Board has 200 employees only. The district offices have a total of 2,000 employees. They noted, however, that there are 3 million small businesses that largely are unregulated because the PCB lacks capacity to conduct inspections every 3-12 months, as mandated by the Air Pollution Control Act.
- In Bangkok, small- and medium-sized enterprises – which cannot afford environmental measures – wait until the inspectors go home at 4:00 p.m. to engage in polluting activities, including burning of solid and hazardous wastes and discharges of metal and pollutant-laden process water into the river and canals?

In addition to staff, resources such as monitoring equipment, laboratory chemicals and instruments, and vehicles are often in short supply. Even when donors provide equipment for these purposes, budget

[44] Meeting with Rick McGowan, Project Planning Specialist, Rural Water and Sanitation Infrastructure and Health Improvement on July 27, 2004, Hanoi.

[45] Meetings: Bangladesh, Mr. M. Reazuddin, Technical Director, Doe. July 22, 2004. India, Dr. V. Rajagopalan, Chairman CPCB, July 21, 2004. Thailand, Mr. Anthony Zola, Advisor, Mae Fah Luang foundation, July 29, 2004.

constraints often preclude proper maintenance and replacement of equipment components. In Chennai, air quality monitoring equipment is out of date and not always properly located to characterize urban air quality.[46] In Sri Lanka,[47] air quality management is stymied by the lack of air quality data, monitoring equipment, and staff funding (as well as deficiencies in the technical expertise of staff).

Staff skills and training

In most interviews with government agencies, a lack of technical skills was identified as the second most important capacity constraint. Most countries are trying to upgrade staff skills to international standards, seeking assistance from donor organizations in order to address this need. In all cases, training needs are greater in sub-regional agencies than in national agencies, the latter better positioned (and located) to receive training assistance from bilateral and multilateral donors and international financial institutions.

The list of skills that are needed includes technical, financial, and management skills including strategic planning and policy analysis, air and water quality monitoring and modeling, inspection and enforcement, operations and maintenance of water and wastewater systems, financial and investment planning and pollution control technologies.

Institutional performance

In the consultations, there was a strong consensus that institutional performance among government agencies needs to be significantly improved in order to meet the development challenges in urban air and water. Although weak performance is treated separately from resource and skill constraints, it is obviously a product of other deficiencies in capacity, as well as weaknesses in enabling conditions and public participation and awareness.

The challenges in improving institutional performance have been articulated in a variety of ways by interviewees. A lack of *transparency* was cited numerous times. Interviewees provided examples where information is not shared with the public, decisions are made in secret or are taken without considering public comments (when there is such a mechanism). In India, a leading NGO[48] observed that they were committed to a fuel testing program because if the State does the testing alone, no one ever sees the results, but an NGO can let the public know the results and pressure for changes in fuel quality regulations.

A second performance issue is *accountability*, which refers to the agency's obligation to protect the public and promote environmental goals in their mandate. One aspect of accountability is efficiency – the ability of the agency to utilize its resources to meet the stated goals of the agency. National and sub-national agencies were widely criticized by interviewees in terms of their ability to conduct air and water quality monitoring, provide continuous supplies of water, and carry out inspections and enforcement

[46] Meeting with CONCERT on July 19, 2004.

[47] Meeting with AirMac on July 22, 2004.

[48] CONCERT in Chennai.

activities. The second element of accountability is corruption, widely acknowledged as a pervasive problem. Inefficiency and corruption are illustrated in vehicle inspection and maintenance programs throughout the region:

- In the Philippines, private emission testing centers have come under scrutiny because vehicles are passing tests without being tested. In one case, 500 vehicles passed the test but only 25 were actually tested.[49] Operations at some of these centers have been suspended because of these problems.
- Random on-road testing of vehicles in Bangkok was viewed by one group of interviewees as an opportunity for local police to take bribes, as the costs of repairs were often significantly higher than the alternative.

2.3.3 PUBLIC PARTICIPATION

The public has an important role to play in environmental governance, but is often constrained in two significant ways in Asia. First, as noted earlier in Section 3.1, there is often a lack of legislation that provides access for the public to participate in environmental decision making. Probably the most impressive example of what can be accomplished when the public (NGOs) have access to the environmental decision making apparatus is the effective use of lawsuits in India to compel policy changes that require improved air quality.

Second, in order to participate effectively, the public needs to understand the environmental problems and solutions. In all countries, public awareness is weak and needs to be improved. In Bangladesh, it was suggested that the use of Environmental Score Cards to bring public attention to urban air and water quality could be effective.[50] In Indonesia, the Ministry of Environment staff indicated that they would like to have resources to carry out public awareness campaigns related to changes in vehicle emission standards and that their roadside inspections are the only mechanism they currently have for increasing awareness. In India, it was noted that air pollution issues were difficult for the politicians and public to understand and required a focused awareness campaign by NGOs to promote policy changes. In many instances, awareness is directly related to the lack of data available to the public. As "representatives' of the public, NGOs also need to upgrade their technical skills in order to participate more effectively in environmental decision making and to better communicate information to the public. However, it was pointed out by all NGOs and many others during the consultations that NGOs are seriously constrained by limited funding that precludes hiring full-time staff and recruiting competent technical experts.

Many of the awareness and public participation issues are illustrated in the provision of urban water. There is seldom little or any public input, particularly from the people who suffer the most from the inadequacy of the service – the urban poor – in any of the US-AEP countries. What is also surprising is

[49] Meeting at the Manila Observatory of Ateneo de Manila, Quezon city, August 4, 2004

[50] Mamumul Khan, Natural Resource Management Specialist, USAID, meeting at the US Embassy, July 21, 2004.

that, when compared to the large and visible lobby for control of vehicle emissions, there is little public for the provision of clean water.

2.3.4 CONCLUSIONS

Improved governance is not merely desirable if changes are to be brought about in air quality and water and sanitation, it is a precondition. There will need to be institutions in place that are capable of planning, implementing and managing programs; they will need to be transparent, committed and effective; they will need to be responsive to public need and encourage public participation. They will, in short, be everything that the civil service, in the US-AEP counties, currently, is not. The present model is broken. Whether it can be fixed is doubtful; the answer is almost certainly to replace it with autonomous agencies that are outside of civil service norms and are held to a higher standard of accountability, effectiveness and integrity. Phnom Penh achieved this in reforming its Water Authority. It is a model that needs to be emulated.

3 OVERVIEW OF ASSISTANCE PROGRAMS

All of the Asian development challenges described in the previous section are being addressed to some degree by US-AEP, multilateral donors and development banks, other bilateral donors, and by multi-donor initiatives. This section presents a brief description of three groups of assistance programs: US-AEP, multilateral donors and development banks and regional initiatives on urban air, water, and urban environment. Other bilateral donor assistance programs also play an important role in addressing Asian environmental problems but are not discussed in this section, except to note their role in regional initiatives.

3.1 US-AEP Program

The US-AEP Program consists of six country programs and regional activities involving multiple countries. In 2004, the program activities, as described in the Regional and Country Work Plans, involved urban air, water, and governance as well as solid waste, hazardous waste, energy efficiency, and eco-housing. Table 3-1 provides a summary of US-AEP activities for water, urban air, and environmental governance. For each program topic, the table indicates the countries in which these topics are the focus of activities, the types of activities undertaken by US-AEP partners and the principal beneficiaries of the assistance.

Table 3-1: US-AEP Activities in Water, Air, and Governance

Program Topic	Countries[1]	Assistance Activities[2]	Beneficiaries[3]
WATER:			
▪ Strengthening of SEAWUN	ID VN PH TH	CB TR	LG
▪ Consensus building and community participation in the Mekong	TH VN	CB TR	RC NG
▪ Safe drinking water treatment technologies	IN	EW PP	LG CS
▪ River/lake restoration	IN	EW PP TT	LG CS
▪ Rainwater harvesting	IN	BP TR PP	CS
▪ Decentralized wastewater treatment and wastewater recycle and reuse	IN	EW PP TT	LG
▪ Local government responsibilities for quality control in water supply	ID	TR	LG
▪ Improved energy efficiency in water management (Watergy)	IN PH	EW PP	LG
▪ Clean Water Act implementation support	PH	EW LP	NG LG CS
▪ Community-based environmental management of river basins	PH TH VN	BP EW	LG CS

Program Topic	Countries[1]	Assistance Activities[2]	Beneficiaries[3]
▪ Oil spill contingency planning in Saigon River	VN	CB EW TR	NG PS
▪ Fundraising strategy for organizational sustainability of the Mactan Channel Council	PH	OF	LG CS PS
▪ Local initiatives for affordable wastewater treatment	PH	EW PP TT	LG
URBAN AIR:			
▪ Support to the Clean Air Initiative for Asian Cities	All	EW TR	NG LG
▪ Air quality control strategies	IN, ID	CB EW PP	LG
▪ Delhi vehicle inspection maintenance pilot	IN	PP TT	LG
▪ Clean fuels for vehicles	IN ID VN	EW PP TT	NG LG
▪ Clean vehicles (engines, emission standards, inspection and maintenance)	IN PH SL TH VN	CB EW LP PP	NG LG
▪ Public awareness of health effects of air pollution	ID PH SL	PA	LG CS
▪ Environmental Governance:			
▪ Regional Environmental Enforcement and Compliance Forum	All	CB, EW, LP	NG
▪ Strengthening of compliance and enforcement	IN PH	CB EW TR	NG LG
▪ Voluntary compliance programs	IN PH VN	EW TR	NG LG PS CS
▪ Civil society participation in environmental decision making	IN	EW LP PA	CS LG
▪ Strengthening of urban environmental management	IN SL TH	CB EW TR	LG
▪ Improved environmental dispute resolution	TH	CB EW TR	NG LG
▪ Strengthening of court policies, practices, and institutions	TH	EW	NG
▪ Support for Public Consultation Act	TH	EW LP	CS

1 Countries are as follows: IN – India, ID – Indonesia, PH – Philippines, SL – Sri Lanka, TH – Thailand, VN – Vietnam

2 Assistance activities are as follows: BP – best practices, CB – capacity building, EW – exchanges and workshops, LP – legal/policy development and analysis, PA – Public awareness and education, PP – pilot projects and demonstrations, OF – organizational financing, TT – technology transfer, TR – training

3 Beneficiaries include the following: NG – national government, LG – local government, CS – civil society, NGO – non-governmental organizations, PS – private sector companies and associations, RC – regional committee/commission

Since its inception, the salient and sustained feature of the US-AEP program has been partnerships. The partners have included institutions in the US and US-AEP countries including national, regional, and local government agencies, research and educational institutions, NGOs and private sector associations, and private companies, as well as international organizations and donors. In the majority of US-AEP partnerships, the partners can be designated as the *assistance* partner(s) and the *beneficiary(ies),* although in some instances, the relationship has involved more of a mutual sharing of expertise and/or information, particularly when the partners are from Asian countries.

3.1.1 US PARTNERS

In all cases, US partners under US-AEP have provided assistance to Asian partners. One group of partners includes the so-called US-AEP Partners, which are contractually linked to the program. This group has included the private contractors involved in providing technical assistance and staff involved in the management and coordination of US-AEP activities in the six country programs, organizations supporting US-AEP through cooperative agreements, plus USEPA, which cooperates with US-AEP through an interagency agreement.

Through the cooperative agreements, US-AEP has been able to access university staff, state and local government experts, and NGOs, and arrange study tours, exchanges, workshops, and technical assistance not covered by the private contractors. In addition, USEPA has provided access to headquarters and regional staff as well as its affiliated centers (e.g., the EPA Center for Conflict Prevention and Resolution). Private sector companies have participated in US-AEP primarily as equipment vendors, demonstrating technologies and providing training assistance on the use of equipment.

Under the cooperative agreements and partnerships with private companies, US-AEP has been able to leverage resources of the partners. For government agencies, the leverage has been mainly in terms of in-kind contributions of staff time and salaries to participate in US-AEP activities. Private companies involved in trade promotion and transfer of technology have covered their time and expenses to host study tours and travel to Asia to install and demonstrate equipment.

In all consultations, Asian interviewees expressed a great deal of satisfaction with the assistance they received from US partners through US-AEP. In most countries, the comments were in reference to US government and NGO partners involved in sharing legal, policy, management, and institutional experience with their Asian partners. In India, US-AEP also was praised for arranging private sector partnerships focused on the transfer of environmental technologies.

3.1.2 INTERNATIONAL PARTNERS

US-AEP has also cooperated with international partners such as the World Bank, the Asian Development Bank, and with multi-donor initiatives in air and water. In most instances US-AEP has played a gap-filling role to complement an initiative or planned loan program, by providing resources for travel to meetings and workshops, or supporting training activities. In some cases, US-AEP has been involved from the outset of the collaboration, helping the international partner to design and implement the program (e.g., the new DIESEL Alliance).

In discussions with ADB, the World Bank, and the Mekong River Commission, interviewees acknowledged US-AEP's limited resources but were very appreciative of the ability of US-AEP to respond to gap financing needs and to help expand the participant base for regional programs and initiatives.

In reviewing US-AEP documents, the assessment team noted that the full value of the international partner's contribution was often presented as "leverage." As US-AEP develops its new strategy, it will be useful to examine partnerships with international organizations and initiatives to determine whether US-AEP participation is catalytic (in mobilizing additional assistance resources) or gap-filling.

3.1.3 ASIAN PARTNERS

In a given year, US-AEP has cooperated with hundreds of Asian partners, drawn from government, the private sector, NGOs and industry associations. The bulk of the Asian partners are beneficiaries of US-AEP assistance, participating in exchanges, study tours, conferences, and training workshops. Another group of Asian partners have worked side-by-side with US partners to carry out environmental assistance activities for other Asian partners within their respective country or, in some cases, in another Asian country. For example, the Laguna Lake Development Authority is both a recipient of assistance from US-AEP and cooperates with Thai partners[51] on community-based environmental management at the river basin level.

3.1.4 CONCLUSION

As is clear from the table at the beginning of this section, US-AEP is already engaged in a significant volume of assistance in the areas of water, urban air, and governance. This experience provides an important base and set of lessons learned that will be important to consider in developing the new regional US-AEP program.

From its inception, US-AEP has been about partnering. This focus has been maintained at the core of the program, even as the program shifted from trade promotion to more demand-driven development assistance. Partnerships today are more diverse and involve a substantial number of local Asian partners, many of whom play an important role in delivering US-AEP assistance.

3.2 USAID and USEPA

In the area of environmental issues, two of the bilateral missions in the region (India and Indonesia) are working on water issues in their assistance programs and the Philippines mission is addressing vehicle emissions issues. In India, USAID's FIRE-D (Financial Institutions Reform and Expansion – Debt market component) is working to develop viable urban infrastructure finance systems and under IR 4.3, USAID-India will be working to improve management of urban water and sanitation systems, in many cases in cooperation with USAID/EGAT and other donors.

USAID in Indonesia is launching its Environmental Services Program, which includes a major component to improve and expand access to key environmental services, including water and sanitation. This new program is linked to the Presidential Initiative, *Water for the Poor*.

[51] Ta Chin River Basin Coordinating Management Sub-committee.

The Office of Urban Programs in USAID/EGAT is implementing the Making Cities Work program and is also a participating member in the Cities Alliance. The water and energy programs in USAID/EGAT are also actively supporting assistance efforts related to integrated water resources management, water access, quality, and sanitation, and air quality.

USEPA cooperates directly with US-AEP in five of the six current program countries (not including Indonesia) but also is involved in activities in the region independently of US-AEP. Notably, the Integrated Environmental Strategies (IES) Program helps countries develop integrated strategies focusing on the reduction of GHG emissions and urban and transboundary/global air emissions in China, India, and the Philippines. USEPA also actively participates in Asian air networks and workshops, and is collaborating with WHO on a new, safe drinking water initiative.

3.3 Development Banks

The major development lenders for South and Southeast Asia are the two development banks: The World Bank and the Asian Development Bank. Annex 2 summarizes their current lending in projects that include urban air quality and water and sanitation.

Relatively few of the projects are specifically directed at urban air quality – just two World Bank projects, one in Bangladesh and one in Thailand. Urban water and sanitation is attracting more project funding, but this is dominated by funding to China, with more than half of all water and sanitation projects in that country. In part, this is a reflection of China's size, but also of the priority that the Government of China is giving to water and sanitation compared to the relatively low priority being assigned by other Asian governments. It also reflects the fact that municipal government and the water authorities are creditworthy institutions in China. In most other Asian countries, this is not the case. The World Bank made a major loan for water and sanitation to Indonesia; the development banks only lend money in countries where it has passed through various parts of the national government before reaching the municipalities. If there were leakages as the money passed through government, then municipalities only received around 70% of the money lent – but were held liable for 100% of the loan.[52] To date, there has been no repayment.

Until such time as the development banks find a modality that will enable them to lend to water authorities directly, and until such time as these water authorities become responsible, creditworthy institutions, the flow of funds into water and sanitation from the development banks is going to remain limited.

3.4 Multi-donor Regional Initiatives

Asian countries are receiving assistance through a variety of regional initiatives, alliances, and networks. In some cases the initiatives are global in scope with components tailored to individual geographical

[52] Meeting with the World Bank Water and Sanitation Program, Jakarta, August 6, 2004.

regions, while some of these initiatives are specifically tailored to Asia. In most cases, the regional initiatives have been created and sustained financially and operationally through the collaborative efforts of donors (including USAID, JICA, AUSaid, and development agencies of Canada and European countries), UN programs, the WHO, and international financial institutions (mainly the World Bank and the Asian Development Bank), partnered with Asian governments. In some cases, NGOs and the private sector are participating in the regional initiatives. In this section, an overview is provided of regional initiatives on urban air and water as well as urban environment. The section concludes with a summary of the key findings on the role and value of these initiatives and potential gaps that might be filled by US-AEP.

3.4.1 URBAN AIR INITIATIVES

Clean Air Initiative for Asian Cities (CAI-Asia)

CAI-Asia was established by the World Bank, ADB, US-AEP and USEPA in February 2001 to "promote and demonstrate innovative ways to improve the air quality of Asian cities." CAI-Asia strives to bring international partners together with stakeholders from government, the private sector and civil society in Asian countries and cities. In June 2004, the CAI-Asia Network included 114 institutions, including 28 cities, 19 national government agencies, 50 NGOs and academic institutions, 13 private sector companies, and 7 multi- and bi-lateral development agencies. The major activities carried out under CAI-Asia include:

- organizational strengthening of local networks in participating cities (currently 28 cities have joined CAI-Asia) to involve the private sector and civil society in addressing air quality problems;
- knowledge management featuring a CAI-Asia Website, http://www.cleanairnet.org/caiasia, the Listserv forum, and the implementation of an air quality management benchmarking task;
- capacity building mainly through the Clean Air Training Network (CATNET) and the World Bank Institute's Distance Learning Course;
- development of air quality policies and harmonization of standards;
- promotion of air quality management strategies; and
- CAI-Asia studies and pilot projects on topics such as CNG policy and regulatory framework, public health and air pollution in Asia, and assessment and recommendations for fuel additives testing protocol.

CAI-Asia also co-organizes the annual Better Air Quality (BAQ) workshop with ADB and has co-financed training programs with Environment Australia, and training and studies with CIDA, DFID, and other donors.

DIESEL Alliance

The DIESEL (Developing Integrated Emission Strategies for Existing Land Transport) Alliance was recently created to assist major Asian cities in reducing public health risks associated mainly with particulate matter emissions from diesel engines. The DIESEL Alliance has been created by USAID, US-AEP, USEPA, ADB, the World Bank and GTZ. Initially, DIESEL will focus efforts to design and implement appropriate policies and technologic solutions in the pilot area of Bangkok. Subsequently, it will replicate and expand the pilot approach to other urban areas through regional exchanges, presentations of workshops, and meetings of existing networks such as CAI-Asia. The impetus for the DIESEL Alliance was the Diesel Emission Reduction Program, a pilot study implemented under CAI-Asia.

Air Pollution in the Mega-cities of Asia (APMA)

APMA was initiated in November 2000 through the collaboration of UNEP, the World Health Organization, the Korean Environmental Institute, and the Stockholm Environment Institute to assist mega-cities in Asia in developing policies that address urban air pollution. Its primary thrust is to build the capacity of Asian governments and city authorities to prepare air quality management strategies and to establish an urban air pollution network in the Asian mega-cities.

APMA collaborated with CAI-Asia on the Air Quality Management benchmarking study of 22 Asian cities and has recently published the guidance document (also in collaboration with CAI-Asia) titled, *A Strategic Framework for Air Quality Management in Asia.* Sixteen Asian mega-cities are the focus of APMA, including five cities featured in US-AEP country programs: Kolkata, New Delhi, and Mumbai in India; Bangkok, Thailand; and Manila, Philippines.

Initiative on Environmentally Sustainable Transport (IEST)

This is a new initiative created by the United Nations Centre for Regional Development in collaboration with the Ministry of Environment-Government of Japan and other governments. IEST will promote the concept of environmentally sustainable transport (EST) in Asia and catalyze actions to formulate appropriate policy instruments, adopt cleaner and efficient technologies, mobilize research, and strengthen or enhance the information base, education, and public awareness. National EST strategies and action plans are currently being prepared for Vietnam, Laos, and Cambodia and will be presented at the EST Regional Forum meeting next year.

Partnership for Sustainable Urban Transport in Asia (PSUTA)

In June 2004, ADB and the World Resources Institute launched a new partnership to enhance the environmental sustainability of transport and mobility throughout Asia. This activity is funded by the Swedish International Development Cooperation Agency and is part of CAI-Asia's Business Plan. PSUTA will involve the review of existing experiences and capacities on sustainable transport in Asia and the preparation of three cases studies, the first two for Hanoi and Xian, China, and the third still to be determined.

Regional Air Quality Management for SASEC Countries

ADB is implementing the Regional Air Quality Management project in the four countries (Bangladesh, Bhutan, India, and Nepal) that comprise South Asian Sub-Regional Economic Cooperation (SASEC). The project is designed to set up local air quality networks, develop appropriate integrated air quality management systems for the SASEC countries, upgrade staff capacities in air quality monitoring, and formulate action plans for selected cities in the four countries. This a small initiative supported by $400,000 from the Japan Special Fund. The project will be closely coordinated with the SASEC countries and CAI-Asia.

Integrated Environmental Strategies (IES) Program

IES is an international program conducted by USEPA in nine countries, including three countries covered by this report: China, India, and Philippines. The program is designed to help host countries prepare baseline air emissions inventories, identify and analyze measures to reduce air pollutants of concern, as well as greenhouse gases, and integrate the most promising measures into the country's planning process.

Cities for Climate Protection (CCP) Campaign

The CCP campaign was established in 1993 by the International Council for Local Environmental Initiatives (ICLEI) to help cities meet their air emission reduction goals for carbon dioxide, methane, and conventional air pollutants produced by combustion of fossil fuels (often from vehicles and stationary sources). More than 100 cities have participated in the CCP campaign, including four in Indonesia, seven in the Philippines, and two in Thailand. The campaign features software to assist cities to carry out energy and emissions inventories and forecasts, develop local action plans, and implement policies and measures to meet established emission targets.

Conclusion

The initiatives in urban air quality are having an impact. Virtually every country in Asia has passed legislation aimed at improving air quality and attempts are under way to follow up on these initiatives. There is still a long way to go, but the issue of air quality is in the public's consciousness and there are NGOs working very actively to bring pressure on governments to follow through. This effort has been most striking in Delhi, where an NGO brought government to the Supreme Court and had the court rule on a range of measures to improve the air quality in the capital.

3.4.2 WATER INITIATIVES

For air initiatives described in the previous section, there were several regional initiatives specifically oriented to Asia. Although a number of water initiatives are described in this section, few focus

exclusively on Asia.[53] In addition, even those water initiatives tailored to Asia do not currently enjoy the widespread participation of Asian countries, with the notable exception of ADB's Water Week workshop.

Water for Asian Cities (WAC)

WAC is an initiative of UN-Habitat and ADB, modeled after the Water for African Cities. The WAC has five major objectives: 1) strengthen governance in water and sanitation; 2) mobilize political will; 3) enhance human resources and institutional capacity; 4) Improve water, sanitation, and hygiene; and 5) promote pro-poor investments. UN-Habitat will provide $10 million in grants, ADB will provide $500 million for loans over the next five years, and the Netherlands will contribute $2.8 million for capacity building activities.

Five cities – one from each of five UN sub-regions – were to be selected for demonstrations of pro-poor investments and development of city action plans. Illustrative criteria for selecting demonstration cities included: 1) an urgent need for improvement in service provisions for the poor; 2) climate and capacity for delivery; and 3) demonstrated commitment to change on the part of local authorities. In India, $200 million in ADB loans has been earmarked for pro-poor water investments in and around the city of Indore, the largest city in the state of Madhya Pradesh.

Water for the Poor Initiative (WPI)

At the World Summit on Sustainable Development in August 2002, the US and Japan announced the Water for the People Initiative, a joint endeavor of the two countries to clean water, sanitation, and improved management of water resources. In March 2003, the US contribution to the US-Japan Water for the People Initiative was unveiled as the Water for the Poor Initiative of President George Bush. WPI represents a commitment of $970 million over three years, with the goals of expanded access to clean water and sanitation, improved watershed management, and increased efficiency of water use in agriculture and industry. The WPI sets a goal of leveraging an additional $1.6 billion for water-related activities globally.

The bulk of committed resources are to be managed by USAID missions, including several in Asia. Thus, the initiative is global in the sense that proposed interventions are distributed throughout the regions of the world, but it is largely a portfolio of bilaterally implemented activities in select countries, with a few notable exceptions. The investigation of arsenic in drinking water is to be conducted in South Asia and the development of effective management approaches will be conducted in coastal areas of Asia. While the WPI provides some financing for capacity building activities and research, most proposed interventions are designed to directly increase water access and quality.

[53] WHO hosted a meeting on September 27-28, 2004 to initiate the creation of a new Asian water initiative, tentatively titled the Asia Safe Water Initiative. During the start-up of this new initiative, WHO will provide the Secretariat with the first task, to set up a Website dedicated to the sharing of regional best practices. The anticipated coverage of the initiative will be broad in terms of type of water issues (e.g., arsenic in groundwater, access, and irrigation) and geographical scope (all of Asia, rural and urban).

Global Water Partnership (GWP)

The GWP is one of the oldest water initiatives, established in 1996 by the World Bank, UNDP, and the Swedish International Development Agency. GWP is both a global partnership and a network of regional partnerships, including one in South Asia (Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka) and another in Southeast Asia (Cambodia, Indonesia, Laos, Malaysia, Philippines, and Thailand).

The goals of the GWP are: 1) to establish the principles of sustainable management of water resources; 2) identify gaps and encourage countries to address critical management needs; and 3) support actions at the local, national, and river basin level. At the regional level, GWP features water forums which focus on key themes such as meeting the Millennium Development Goals or integrated water resources management. In South Asia, GWP countries have formulated South Asia Water Vision 2025 and a Framework for Action for a range of water topics.

Southeast Asia Water Utilities Network (SEAWUN)

SEAWUN is a regional network of water and sanitation utilities established in 2002. SEAWUN is comprised of 13 water utilities in Indonesia, Philippines, Malaysia, Thailand and Vietnam and 4 national water associations in all of these countries except Thailand. SEAWUN strives to help its members improve service delivery, attain operational and management efficiency, achieve financial viability and advocate for water sector reforms and improved water policies.

SEAWUN receives financial support from ADB and other donors, including DANIDA (funding for the SEAWUN 2004 Convention) and US-AEP (training programs and operator certification programs). In 2004, SEAWUN is trying to expand its base and has targeted 40 utilities and associations as potential members.

ADB Water Week

ADB Water Week is not an initiative in the sense of established day-to-day activities, but a platform for stimulating knowledge development in the water sector, particularly focused on addressing the water needs of the poor. Water Week is organized by ADB's Water Sector Committee, which includes representatives from ADB's five regional departments, the Private Sector Operations Department and the Regional and Sustainable Development Department. The first Water Week was held in 2002 and the second Water Week was convened in 2004. These conferences have been organized around a theme – in 2004, the theme was "Water for the Poor – Setting the Rules and Finding the Money."

Safe Drinking Water Alliance (SDWA)

The SDWA is a public-private collaboration announced in April 2004 at the UN Commission on Sustainable Development meeting. It is a limited-term partnership between USAID, Johns Hopkins University, CARE, Population Services International (PSI), and Proctor & Gamble. The goal of SDWA is to reduce the incidence of illness and disease related to unsafe drinking water. The Alliance will demonstrate low cost solutions to unsafe drinking water in Pakistan, Haiti, and another country to be

selected. The technology demonstrations will be complemented by a communications strategy and guidance to better manage water-borne disease outbreaks.

Network of Asian River Basin Organizations (NARBO)

NARBO was established in 2003 by the Japan Water Agency, ADB, and the ADB Institute to promote the exchange of information and experience among river basin organizations, strengthen their capacity for IWRM, and improve water governance. NARBO's members include 12 river basin organizations from 8 Asian countries, governmental organizations from 9 countries and 12 regional knowledge partners such as GWP for South and Southeast Asia, research institutes and universities.

NARBO's activities are expected to include the following: 1) advocacy and improved awareness of IWRM; 2) sharing of good practices and lessons learned; 3) support for members in governance, enabling policy, and formulation of action plans; 4) capacity building through exchanges, training, and technical advice; and 5) fostering regional cooperation on water management in transboundary river basins.

ASEAN Working Group on Water Resources Management

The ASEAN Working Group on Water Resources Management was created in response to the GWP Southeast Asia Partnership's request to place water resources high on the ASEAN agenda. The Working Group is focusing its activities on a survey and data collection effort funded by Australia and the development of an "ASEAN Strategic Plan of Action on Water Resources Management."

Gender and Water Alliance

The Gender and Water Alliance is a network of 300 organizations and individuals throughout the world, associated with the GWP, and funded by governments in the Netherlands and United Kingdom. Its major functions include information and knowledge sharing through its Website, electronic conferencing, and capacity building and pilot programs.

Conclusions

There are as many initiatives in urban water supply as there are in urban air but, by contrast, urban water seems to have achieved little progress or even public awareness. Given the magnitude of the problems caused by lack of access to a supply of clean drinking water, and the high social and financial costs that procuring water imposes on the urban poor, this is surprising. The difference might be that, while CAI-Asia has become an effective advocacy institution to promote air initiatives, there is no such advocacy institution for water.

In addition, successful air initiatives have been technological initiatives at the Central Government level, such as the removal of lead from gasoline. When initiatives have had to involve management and capacity at any lower level – vehicle inspection and maintenance, for example – there has been failure. Urban drinking water mostly involves a level below national government and requires a great deal of management and capacity.

3.4.3 URBAN INITIATIVES

Cities Alliance

The Cities Alliance was established in 1999 to combine the resources of development partners with cities throughout the world to improve living conditions of the urban poor. The Alliance's development partners include the World Bank and ADB, UN-Habitat, and donor organizations from the United States, Canada, Japan, and seven European countries.

The two key areas of focus for the Cities Alliance are the design and implementation of city development strategies (CDS) and support for actions to upgrade city-wide and nation-wide slums. A centerpiece of the Alliance's efforts, bridging the two key areas, is the *Cities Without Slums* Action Plan developed in 1999 and endorsed during the September 2000, UN Millennium Summit. The Cities Alliance has been active in Asia, assisting with the preparation of CDS in China, the Philippines, and Pakistan, and with slum upgrading projects in the Philippines, Thailand, and Vietnam.

ASEAN Working Group on Environmentally Sustainable Cities (ESC)

The concept for the ESC program was proposed by Singapore and endorsed by ASEAN members in 2003. A framework for ESC was drafted and approved in December 2003 calling for the ESC program to build on the ASEAN Vision 2020 and ASEAN Hanoi Plan of Action. The initial focus of the ESC program will be on clean air (stationary and mobile sources of air pollution), clean water (reduced pollution in surface and ground water to allow treatment for potable use), and clean land (improved waste management, waste minimization and recycling, and development and safeguarding of green areas in cities).

ASEAN has asked its members to select one or more cities to participate in ESC and 19 cities have already been selected. These cities will be invited to participate in a workshop planned for Singapore and will be the focus of demonstrations and a source of case studies. The working group will work with ASEAN member countries, ESC cities, partner countries (China, Japan, and South Korea), and international donor and financial organizations.

Kitakyushu Initiative Network for a Clean Environment

Kitakyushu is a city in Japan that has successfully addressed severe pollution problems. City leaders proposed an initiative in 2000 at the Ministerial Conference on Environment and Development in Asia and the Pacific to provide a mechanism for sharing the city's experience with other cities in the Asian and Pacific region. With support from the Japanese government, UNESCAP (UN Economic and Social Commission for Asia and the Pacific), and the City of Kitakyushu, the initiative was launched in 2001. As of June 2004, 60 cities from 18 countries had joined the Initiative.

The initiative's goal is to assist cities in the region to address environmental quality and human health concerns through local initiatives to control urban air and water pollution, minimize waste, and alleviate other urban environmental problems. Cities like Kitakyushu that have been successful in addressing

environmental problems share ideas and experiences with other cities through various information transfer mechanisms, including an annual meeting. Cities may also request technical assistance from UNESCAP and from Japanese donor agencies to develop policies and standards for air, water, and waste, and for activities such as capacity building, awareness raising, and fostering stakeholder participation.

Conclusions

The Cities Alliance is the oldest, most funded, and most active of the three urban initiatives. The ASEAN Working Group has the potential to involve a large number of cities and includes many which are facing a litany of urban environmental problems, as well as some of the region's success stories, such as Singapore. While all three initiatives might conceivably focus on air quality issues, the Cities Alliance focuses mainly on the problems of the urban poor with shelter, water, and sanitation as the main priorities. Most of the participating cities in the ASEAN Working Group are small- and medium-sized cities and are more likely to work on water and waste issues than air. The Kitakyushu Initiative has a broad base of cities, including several in East Asia, and could be a source of lessons learned for South and Southeast Asian cities.

4 CONCLUSIONS

This strategic assessment has been conducted in the context of an approved concept paper for the new US-AEP regional program and in response to the guidance and direction provided in the Final Parameters Cable. We affirm that the proposed program content responds to the most important urban development challenges in Asia. The assessment team examined water and governance in terms of the broad parameters specified in the concept paper, but evaluated urban air in narrower terms, based on instructions to disregard "roads not taken" (solid waste management, hazardous waste, and energy).

After more than 100 consultations and the review of an enormous volume of material, IRG examined urban water and air issues from three areas of focus – economic growth, health, and impact on low income groups – to better determine the relative importance of addressing these in terms of the division of program resources. The findings of this report confirm the value of focusing the US-AEP program on urban water and air, with governance as a crosscutting issue. However, we believe there is a compelling case for focusing more program resources on urban water than air when these program areas are evaluated in terms of the three perspectives mentioned above. Our findings in support of this conclusion can be summarized as follows.

For water:

- Unsafe drinking water and sanitation contribute to high rates of morbidity and mortality, particularly among children five years old and younger.
- Asian cities are plagued by high incidences of diarrheal illnesses and episodic outbreaks of water-related diseases, such as cholera.
- The lack of access to safe sources of drinking water has direct and significant economic impacts on the urban poor, as they often pay appreciably more in absolute terms for water and/or invest time to "harvest" water at wells and public standpipes.
- Poor water quality and availability can be a significant constraint on economic growth, discouraging large companies from locating in urban areas with poor water services, and limiting the growth of small and medium enterprises.
- Given that gathering water for families is a very time consuming job, usually assigned to women, it presents a barrier that precludes women from seeking more productive employment and young girls from attending school.

For air:

- Urban air pollution is a significant source of health risk, resulting in respiratory illness and premature death, but ranks behind water in terms of mortality and morbidity impacts.

- All urban residents suffer economically because of health-related challenges caused by air pollution, including wages lost due to respiratory illness and higher medical costs, but poor air quality does not have the same effect of discouraging economic growth.
- The overall health burden of air pollution is greater for the poor because of longer daily outdoor exposure to air pollution, the poor population's proximity to roadways and industry, inadequate ventilation of their sub-standard housing, and reliance on biomass fuels for cooking and heating. But the associated economic costs of air pollution do not fall more on the poor than on other income groups.

For water, there is also the likelihood that with continued urban growth, the problems will worsen. In addition, the team believes that water access has received substantially less donor attention than air, and US-AEP has an opportunity as a highly flexible and catalytic entity to elevate concerns and mobilize resources to solve water access problems.

In virtually all of the consultations, weak governance was noted as one of the major barriers to accessing clean water, urban air quality, and environmental quality in general. While Asian nations have made strides in enacting environmental legislation, there are still significant gaps to be addressed to strengthen public participation in environmental governance and to facilitate the implementation of investments in water access, and design of effective air quality programs. Even more challenging is the problem of how environmental governance relates to institutional capacity, particularly where management and enforcement responsibilities are devolved to poorly staffed and financed regional and local authorities. The team also noted the need to increase public awareness of environmental problems. Urban residents appear to be more keenly attuned to air pollution issues than to water access and quality. Improved public awareness can provide a catalyst for a greater role for civil society in decision making and prepare public groups to make better contributions, once they have secured a greater role.

What can US-AEP do to address these problems? Both urban problems pose major challenges and US-AEP must continue to draw on its strengths: facilitating partnerships, leveraging other donors' resources and capitalizing on its capacity to share experiences across the region. The US Consul General in Kolkata, India, likened US-AEP to a speedboat among supertankers because of the program's flexibility and maneuverability. As a regional program, US-AEP can look widely for partners in Asia, draw from its pool of US private and public sector partners, and work at the local level to achieve impact that can then be aggregated or even multiplied across the region. The focus on urban water and air also plays to regional sharing of experience because all Asian cities face the same set of challenges – legal structures and institutions may differ but they all strive to reduce the impacts of unsafe water and air.

As US-AEP looks to the future, it will need to cultivate strategic partners that bring resources and influence that can be leveraged, multiplied, and sustained. In the past, many of US-AEP's Asian partners were simply beneficiaries of program activities such as exchanges and workshops. Given the emerging model in Asia of development *cooperation* instead of development *assistance,* Asian partners will be called on more often to lead and implement US-AEP activities. US-AEP will work closely with governmental agencies and water utilities in Asia, and will need to expand its cooperation with NGOs and community groups in addressing water access issues.

US private and public sector partners will still be featured prominently in the US-AEP program to transfer technologies and expertise and participate in twinning arrangements to improve enabling conditions in water and air and build institutional capacity. In order to leverage resources, US-AEP also will need to cultivate more international partners and look for opportunities to work with USAID/Washington programs and the bilateral missions in the region, as well as other donors and multi-donor initiatives.

ANNEX 1: DEVELOPMENT CHALLENGES: COUNTRY-BY-COUNTRY ASSESSMENTS

Bangladesh

OVERVIEW

Bangladesh, with 133 million people settled on a land area about the size of Wisconsin, is one of the most densely populated countries in the world. Fully half the population lives below the poverty line, which makes Bangladesh one of the poorest countries in the world. It is a low-lying country formed by the deltaic plain at the confluence of three rivers: the Ganges, the Brahmaputra (Jamuna) and Meghna. It is cursed with more than its share of natural calamities including annual floods, cyclones, tornadoes, and tidal bores. With the surface water polluted by man and the groundwater polluted by naturally occurring arsenic, much of the country's plentiful water is not safe to drink.

Major impediments to growth in the country include inefficient state-owned enterprises, inadequate port facilities, insufficient power supplies, an unwillingness to exploit and export its abundant natural gas, and the slow implementation of necessary economic reforms. In addition, Bangladesh is rated by *Transparency International* as the most corrupt country on earth.

The countries NGO's are amongst the largest and most active in the world and tend to fill many of the roles that the State has difficulty playing. They are important players in education, health, micro-credit, and social mobilization, especially for the poorest people.

URBANIZATION

In 1995 Dhaka was a city of 8.5 million people. The UN estimates that by 2025 it will have a pollution of 19.49 million, making it the fastest growing city in South Asia. This is the result of both a 2% population growth rate and the inability of rural areas to absorb most of the resulting increase in labor. Dhaka cannot provide basic services for the bulk of its existing population and the prospects for addressing future growth are dim.

Other than Dhaka, the major cities are Chittagong with a current population of 2.8 million, Khulna with 1.8 million, and Rajshahi with 1 million.

PUBLIC HEALTH

The infant mortality rate at 64.32 deaths per 1,000 live births is high as is the maternal mortality rate of 350 per 10,000; both are a reflection of early marriage and child bearing, widespread malnutrition, and poor pre- and post-natal health care. Life expectancy is 61.75 years. All of the water borne disease

prevalent in Asia is endemic in Bangladesh—it is one of the 11 countries in the world where TB is endemic.

URBAN WATER & SANITATION

The Dhaka Water Supply and Sewerage Authority (DWSSA) is the sole authority responsible for the provision of water and sewerage in the Dhaka urban area. Since 1998 there has been a national policy for Safe Water Supply and Sanitation that promotes the provision to the urban poor at cost, mentions private sector participation in the sector, and aims to reduce non-revenue water (NRW). In spite of the policy, none of the above has been undertaken in Dhaka. With 11.6 staff per 1,000 connections, DWSSA is clearly overstaffed. Management is poor, technical capacity is low, and management-union tensions limit the Authority's flexibility.

Most of the water supply for Dhaka is from deep tube wells, which has resulted in the lowering of the groundwater table. The Authority has just commissioned a treatment plant with a capacity of 225,000 m^3 a day, and is harnessing surface water from the Buri Ganga (River) and the Shitalakhya River. Both are subject to pollution from toxic discharges despite legislation to control this.[54]

DWSSA claims service coverage of 72% of the urban population but this appears to exclude large parts of the periurban area. NGOs have established 126 locations at which they buy water from the authority and then sell it to slum dwellers. There are some 1,209 public taps in the city at which water is supplied free. More than 1.5 million people do not have access to DWSSA water; they meet their needs by forming joint undertakings and sinking tube wells or by purchasing water from small-scale water providers (SSWPs).

The DWSS supply in all areas is intermittent. This is due to mechanical failure, inadequate supply, and electricity load shedding. NRW is 40% and usage is 115 l/c/d. The water supplied by DWSSA is not of drinking water quality nor is there any authority that is mandated to monitor the water to ensure that it is of any set standard.

There is a simple tariff structure for water. Domestic usage is charged at $0.079 and non-domestic at $0.263. Use that is not metered is based upon property tax and, for the heaviest users this is the method of choice, ensuring that there is little incentive to conserve water.

Around 30% of the population of Dhaka is connected to the sewerage system. Some household use septic tanks, other dispose of wastewater through surface drains or into storm water sewers and water bodies. No pollution controls are enforced.[55]

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[54] Mr. Mamumul Khan, Natural Resource Management Specialist, USAID

Mr. Khan discussed the problem of contamination and management of open water areas and wetlands in Bangladesh. Institutional conflicts between ministries which manage different forms of land use have resulted in reduced fish productivity in these waters that poor people depend on for their food source.

[55] Univ. Bangladesh) Traditional septic tank-drain field systems do not work because they are often flooded. Inexpensive, but effective technologies are badly needed in Bangladesh. Dhaka, specifically, has an old and leaking sewage system

AIR QUALITY[56]

The Ministry of Environment and Forestry have overall responsibility for air quality in Bangladesh. They are actively implementing the World Bank funded Air Quality Management Program aimed primarily at improving the air quality in Dhaka. The AQMP has been extended through 2005. In January 2006, the World Bank expects that government staff and all air monitoring activities will be funded by the GoB. There is much concern, however, that GoB may not meet this commitment, thereby terminating all air quality work in Bangladesh.

The Ministry has completed work on the adoption of new vehicle emission standards and an air quality index for Dhaka and forwarded it to the cabinet for adoption.

Until recently there was essentially no air quality management system in place to tackle pollution. The Government has now set up a regulatory and institutional framework to address urban air quality.

The addition of lead to petrol was terminated in 1999. Air quality has improved measurably in Dhaka as the result of this government effort to remove lead from petrol, together with the banning of 2-stroke three-wheel implementation of CNG as an alternative fuel.

To address particulate matter the government has had to deal with the 50,000 three-wheel taxis in Dhaka. In 2000, 427 mechanics were trained on proper repair and tuning to reduce emissions. In addition workshops were held for drivers and the adverse health affects of emissions explained. Government also worked with the Bangladesh Petroleum Corporation to set minimum standards for fuels and lubricants for 2 and 4-stroke engines.

Two-stroke, three-wheel vehicles were phased out with the last phase-out occurring in December 2000. The Government also imposed a 200% import duty on the vehicles. This was done in the face of strong opposition from the operators of the vehicles.

Old diesel trucks and buses remain a significant problem however. A further problem is the mix of motorized traffic and non-motorized rickshaws on Dhaka streets. This leads to traffic jams that contribute to vehicular air pollution. The other problem that has not yet been addressed is that of fuel adulteration which is universal in Bangladesh.

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with only 20% of the population receiving properly treated drinking water. Three-fourths of the sewage goes into open water bodies in and around Dhaka. No other cities or towns in Bangladesh have sewage treatment facilities.

[56] Mr. Khan described the air quality issues in Dhaka and the importance of CNG fueled vehicles as replacements for the 2-stroke, 3-wheeled taxis that were banned by GoB in January 2001. He cited successes in CNG conversion of vehicle fleets and the current need to control diesel emissions from buses and trucks.

According to USAID's Khan, the most needed USAEP interventions are in the areas of:

- Brick kiln construction standards, fuel use and best management practices to save energy and reduce air pollution emissions
- Urban waste management
- Strengthened compliance and improved governance
- Use of Environmental Score Cards to bring public attention to urban air and water quality.
- CNG technology transfer to allow local people to learn from others in Asia

New programs to deal with gross polluters through roadside vehicle inspections are under way, but enforcement suffers from inadequate staffing and a general lack of resources.

Other than vehicles, the brick kilns surrounding Dhaka are significant sources of air pollution burning poor quality coal, wood, or waste oil.

CONCLUSIONS AND COMMENTS

Water and sanitation are the two huge issues that need to be addressed in Bangladesh. Efforts are being made by some NGO's in Dhaka and there are small success stories; but given the projected growth of Dhaka it will have to be addressed and dealt with at government level.

Bangladesh is a country where the donors can point to more failures than successes, but the ongoing Air Quality Management Program in Dhaka has had some successes in advancing air monitoring activities, program development, staff training, and real emission reductions. If GoB fails to fund these programs after completion of the AQMP, much of the progress made to date may be lost. It has made a visible difference to air quality in the city and pressing ahead with these measures should continue this improvement.

Cambodia

OVERVIEW

Cambodia is one of the smaller countries of Asia. It covers an area slightly smaller than Oklahoma and has a population of just over 13 million. The country suffers from a legacy of decades of war and internal strife which destroyed much of the economy and has left it with income levels that are lower than its most of its neighbors. Infrastructure, education, and health facilities all remain inadequate.

Although it is now in an era of relative peace, political infighting, an inadequate legal system, and an underlying feeling of instability have hindered private foreign investment. The two bright spots in the economy have been tourism and the garment industry which have helped to keep GNP growth at around 5% a year.

Cambodia is a constitutional monarchy with a constitution that provides for a multi-party democracy. The king is the head of state and the prime minister the head of government. There are seven deputy prime ministers, 40 ministers, 135 secretaries of state and 146 undersecretaries of state in the executive branch.

URBANIZATION

Cambodia is still a predominantly agricultural country with most of its population living in the rural areas. Phnom Penh, with around 1.5 million people, is the only urban area of any size.

PUBLIC HEALTH

Cambodia has a high infant mortality rate of 73.67 deaths per 1,000 live births. Life expectancy is also low for a Southeast Asian country at 58.41 years.

WATER & SANITATION

In 1996 the Government of Cambodia determined that the people of Phnom Penh should get clean drinking water and sanitation. On advice from the donor community it formed the Phnom Penh Water Supply Authority (PPWSA), a truly autonomous corporate body responsible for the provision of that supply.

The Phnom Penh Water Supply Authority is answerable to the Phnom Penh Municipal Government for its performance and, although not privatized, as an autonomous body, is not subject to civil service terms and conditions of service. This gives it the freedom to pay competitive salaries and demand performance from its staff.

Ek Sonn Chan, Director of PPWSA describes the situation in the first half of the 1990's as one where the authority was heavily subsidized by government. It had 500 staff that was on an average salary of $20 a month. The staff was under-qualified, under-paid, and inefficient. Nepotism was widely practiced, and both discipline and morale were low. They were running a distribution system that covered 40% of the city area and served 20% of the population. Of the water supplied around 14% was paid for. The system was, in fact, amongst the worst of any Capital city in Asia.

In order to change this, and with the help of the development partners including the World Bank, ADB, France, and Japan, the entire organization was restructured. Higher management was given more direct responsibility; Members of the younger generation were promoted to higher levels while older managers were put into dormant roles. These younger managers were given training including some of them being sent overseas to obtain MBA's. Salaries up to 10 times higher and bonus payments were introduced, and the number of staff reduced.

The distribution network inherited by the new management team consisted of 280 kilometers of pipe that had been put in place by the French, the Chinese, and the Russian, all using different, and mutually incompatible standards. Illegal connections were the norm, and collection the exception. Politicians and bureaucrats generally did not pay water bills.

Change required strong political support which was forthcoming. The Prime Minister set the example by paying his water bill and other people of influence followed. Meters were installed, illegal connections attracted high fines, and the authority embarked upon a 24-hour leak repair and maintenance system. In 1996, with donor funding, PPWSA started to renew and rehabilitate its network; work that was completed by 2002. Treatment plants were also rehabilitated and constructed. A new 16 km transmission line has been built and 600 km of distribution line laid.

Today, PPWSA has 84% coverage with 24-hour supply. Revenue collection efficiency is 99% with all connections metered and a computerized billing system in place. NRW is 26% and the staff per 10,000 connections is 5.4. Consumption is 104 l/c/d. the tap water is safe to drink.

Coupled with all of the improvements to service were large increases in tariffs. Current tariffs are on a block basis with domestic rates starting at ₰0.141 for the first 7 m^3 a month rising to ₰0.325. Non-residential tariffs run from ₰0.243 to ₰0.371 m^3.

PPWSA takes its raw water from the Mekong and Bassac Rivers and from Tongle Sap.

Within Phnom Penh, the majority of households have access to flush toilets connected to septic systems or sewerage; all sewers are discharging, without treatment, into rivers and water bodies.

AIR QUALITY

Cambodia is one of the few countries in Asia that has done little or nothing to improve air quality in its urban areas. Arguably its problems are less than many other Asian countries with its largely rural environment and no mega-cities.

Where the country has taken action on the environment has been under the World Bank funded ***National Environmental Action Plan.*** This concentrated mainly on the rural and coastal areas with one urban component—solid waste management.

There are environmental regulations including fuel and emission standards but currently the Ministry of Environment has no ongoing initiatives dealing with urban air quality.

CONCLUSIONS AND COMMENTS

While nationally Cambodia suffers from a number of governance issues, it has taken a barely functioning water authority and made it into one of the best in the developing countries of Asia. This has been achieved through incorporating PPWSA, giving it real autonomy, clear government policy and support for such autonomy, and completely restructuring the management of the organization. This has led to massive improvements in service and coverage and allowed it to increase tariffs in order to cover costs. It should be noted that this was achieved without privatization of the authority.

China

OVERVIEW

China has a population of 1.3 billion. Its per capita GDP is $1,090 with a growth rate of 9.1%. Since the late 1970 China has been moving from a centrally planned to a market economy. Its GDP has quadrupled in 25 years and its economy (in purchasing power parity) ranks second after the US. Foreign investment is strong. Petroleum imports are rising annually. Ten years ago China was the seventh largest importer of forest products. Now it is the second.

GOVERNANCE

The political system of China is under strict Communist control. However, collectivization has been abandoned in favor of village and household responsibility. Private organizations and individuals play increasingly important roles in the economy.

URBANIZATION

China has undergone a policy shift in favor of industrialization and mega-cities. 38% of China's population is now urban, up from 26% in 1990. Shanghai's, Beijing's, and Tianjin's populations are projected to reach 24, 19, and 16 million respectively by 2015. This rapid urbanization has resulted in 80 to 120 surplus workers from the rural areas migrating to the cities and surviving on part-time, low-paying jobs. Environmental pollution and insufficient housing are serious.

PUBLIC HEALTH

Infant mortality is 25 per 1,000 live births and life expectancy is 72 years. Respiratory and heart diseases due to air pollution are the leading causes of death.

URBAN WATER & SANITATION

Policy, governance and regulatory framework

The State Environmental Protection Administration (SEPA) was upgraded to a ministry-level agency in 1998. SEPA's is responsible for environmental management, pollution control, and environmental impact assessments of development plans and technological policies. Its functions related to water, sanitation and air pollution include:

- Formulating and enforcing guidelines, policies, laws, and regulations.
- Formulating national standards for environmental quality and for pollutant emissions.
- Coordinating efforts to deal with major environmental problems involving different agencies, regions, and provinces.
- Overseeing environmental monitoring and statistics.
- Legislation regarding water and sanitation includes:
  - Implementing Rules on the Law of PRC on the Prevention and Control of Water Pollution, 2000.
  - Interim Measures on the Administration of Key Water Pollutants Discharge Permit in Huai River Basin and Tai Lake Basin, 2001.
  - Circular on Urban Water Supply, Water Saving and Water Pollution Control by the State Council, 2000.

- Implementation of the Law of the PRC on the Water Pollution Prevention and Control, 2000.
- Regulations on Pollution Prevention of Yangtze River from Vessels Disposal and Coastal Solid Wastes, 1998.
- Regulations on the Inspection and Treatment Procedure of the Pollution Accidents in Fisheries Water Areas, 1997.
- Interim Regulations on the Prevention of Water Pollution in the Huai River Valley, 1995.
- Provisions for the Administration of the Prevention and Control of Pollution in Protected Areas for Drinking Water Sources, 1989.
- Supervision for the Sewage Treatment Facilities, 1998
- Interim Measures on the Administration of Water Pollutants Discharge Permit, 1998.

The Water Authorities

The water and sanitation authorities in China are the regional and municipal water supply companies. Chengdu Municipal Water Supply General Company with a staff of 1,691 supplies 917,562 m3 daily through 50,077 connections to 2,400,000 people. Shanghai Water Bureau with a staff of 17,000 supplies 4,946,904 m3 daily through 2,995,000 connections to 10,500,000 people. The capital expenditures per connection are $170 and $40 respectively.

Water sources

Water supply coverage is 82% in Chengdu and 100% in Shanghai. Urban dwellers not connected to the supply generally take drinking water directly from the rivers, 80% of the rivers flowing through cities are polluted.

The distribution system

Urban access to improved drinking water[57] dropped from 100% to 92% between 1990 and 2002. Whereas urban household connections rose from 80% to 91% during this period

Water quality

Drinking water in China is highly contaminated with human, animal, industrial, and agricultural wastes. Nearly 700 million Chinese drink water with fecal coliform contamination that exceeds the maximum permissible levels by 86% in rural areas and 28% in urban areas.

[57] Includes household connection, public standpipe, borehole, protected dug well, and rainwater collection: WHO and UNICEF, 2004

Tariffs

Chengdu and Shanghai have single tier domestic tariffs of just under $0.13/m^3. The surcharges for sewerage are 45% and 61% respectively.

Sanitation

Urban sanitation coverage rose from 64% in 1990 to 69% 2002[58]. However, China's handful of wastewater treatment plants cannot keep pace with the increasing amounts of sewage. In 1995, Beijing had only one secondary sewage treatment plant and there were only 100 in the whole country. Only 5% of urban wastewater and 17% of industrial wastewater receives any treatment before entering the rivers and lakes. Chengdu has about 85% sewerage coverage, and Shanghai 67%.

AIR QUALITY

Policy, governance and regulatory framework

In the past ten years China has rapidly passed new environmental regulations. However, compliance is still low.

Legislation regarding air pollution includes:

- Law of the PRC on the Environmental Impact Assessment, 2002.
- Circular of Stopping Production, Sale and Use of the Leaded Gasoline Within a Time Limit by the General Office of the State Council, 2000.
- Technical Policies on the Prevention and Control of Pollution by Motor Vehicle Emissions, 1999.
- The First Catalogue of Eliminated Technologies & Equipment Causing Serious Air Pollution, 1997.
- Industrial Policy on Automobiles (excerpts of environment-related provisions), 1994.
- Regulations on the Administration of National Monitoring for Tailing Gas Exhaust Emission of Motor Vehicles (Tentative), 1991.
- Supervision for the Automobile Exhaust Pollution, 1990.

Regulatory

The concerned agency for air and water pollution is SEPA.

[58] Includes connection to public sewer, connection to septic system, pour-flush latrines, and ventilated improved pit latrines: WHO and UNICEF, 2004

Extent of air pollution and source

Seven of the ten most polluted cities in the world are in China[59]. China itself considers that two thirds of the 338 cities, for which there are data, are moderately to severely polluted. Bituminous coal makes up 75% of China's primary energy sources, exposing the population to high levels of SO_2 and the carcinogen benzopyrene. Serious levels of CO come from vehicles in Beijing. Compared to developed countries China's vehicles emit 2.5 to 7.5 times more hydrocarbons, 2 to 7 times more NOx, and 6 to 12 times more CO.

OVERALL CONCLUSIONS AND COMMENTS

China is well aware of her problems with urbanization and pollution, and second wave of urbanization may well include eco-cities. A May 2004 report on Suzhou states that this city of 2.2 million has attracted an estimated $5.3 billion in foreign investment. It is one of 10 nationally designated "model environmental cities" and is "one that isn't inextricably linked to social and ecological devastation. "

Tianjin, the sister city of Beijing, hopes to cash in on the 2008 Olympics and become the "Beijing-Tianjin Ecological Zone" by drastically improving its air and water quality. As part of its bid for the 2008 Olympics, China committed $17.9 billion for infrastructure and environmental improvement. Tianjin's environmental protection bureau is embarking on six projects to improve the environment before 2008. The program includes:

- Expand domestic sewage treatment to 84% by building two additional treatment plants with total daily capacity of 890,000 m^3.
- Continue to convert coal-burning facilities to natural gas and begin to convert public transport to run on LPG and CNG.
- Expand cogeneration of municipal steam heat from power plants.
- Increase the sulfur emission levy on factories and power plants so as to encourage them to invest in desulphurization technology.
- Reduce TSP pollution 10% and SO2 by 20%. Attain national level II daily air quality standard 70% of the time by 2005.
- Strengthen automobile emissions inspection so as to effectively enforce national emissions standards. Improve the quality of automotive fuel.
- Implement a "total emissions control" system (i.e. cap total emissions) for power plants within the municipality.
- Increase sanitary treatment of municipal solid waste to 70% and of hazardous waste to 100%.

[59] WHO, 1998

- Increase urban green space to 30% and rural forest cover to 17.6%.

India

OVERVIEW

With a population of over 1 billion people and the 12th largest economy in the world, India is the dominant power in South Asia. Of that population, one third is aged below 15 years, presenting the need for a rapid growth of jobs in the coming years. India is still predominantly a rural society with 70% of the population living in rural villages and the remainder in 200 towns and cities.

More than 25% of India's population is poor, and many of these are illiterate. In contrast to this large number of illiterate poor, India boasts a dynamic and rapidly growing IT sector with revenue estimated at $8 billion a year

India is the World's largest democracy with a President and a bicameral parliamentary system. Real national executive power lies with the council of ministers led by the Prime Minister. Like the United States, India has a federal form of government with 28 States and 7 Union Territories. Each State has a presidentially-appointed governor who can assume broad powers when directed by central government. This has been exercised by central government in the past.

URBANIZATION

India is still at a relatively early stage of urbanization with the rate of growth of urban conurbations certain to increase over the next two decades. India has three cities that presently qualify as mega-cities, all of which will attain populations greater than 15 million by 2025. One—Mumbai (formerly Bombay)—will be closer to 30 million. The other two—Delhi and Kolkata (formerly Calcutta)—will be around the 16 to 17 million mark. Unemployed rural labor and small farmers who will move to these cities in search of work will fuel much of this growth. These people will settle into the existing informal settlements, already under-provided with basic services.

PUBLIC HEALTH

Maternal mortality in India at 540 deaths per 10,000 live births gives the country the dubious distinction of accounting for 25% of the world's childbirth-related deaths. Malnutrition affects half of all children under the age of five, 34% of newborns are significantly underweight, and 60% of the female population is malnourished with anemia.

All water related diseases common in Asia are endemic in India with the incidence falling mainly on the poor.

WATER & SANITATION

Central government has limited responsibility for water supply with financing left to state governments and management to the municipal authorities. Decades of Gandhian socialism have left a legacy of dependency, with the widely held belief that "government will provide." This has created a situation in which tariff increases are seen as politically risky for parties operating within the Indian democratic system. In fact, one of the perennial vote getters for politicians is the promise to roll back any fee increases, forgive debt, or even make a service free. While it is often argued that the poor cannot afford to pay for services, subsidies for water, electricity, and other basic services benefit the people who are connected to the service; this does not include the poor.

The water authorities in the major Indian cities are typically under-funded, overstaffed, open to corruption, and deficient in management ability. They are all essentially an extension of the local government service with salaries, job security, and terms and conditions of service that reflect this. There are, within all of the authorities, people of real technical ability but in the absence of any effective management they have limited ability to improve the system.

Given the political importance in generating jobs, many of the water boards are overstaffed. The Delhi Jal Board, for example, has 27,000 staff of whom 25,000 are unskilled. This represents 19.9 staff members per thousand connections.

Water quality in India is steadily degrading due to a combination of factors including saline intrusion, sewage effluent, industrial effluent, and urban and agricultural runoff. Problems of pathogenic agents in the water are particularly severe. Of the major cities, Chennai is suffering an acute shortage of raw water.

The priority for water use in India is: agriculture – urban drinking water – industry – commerce. In practical terms the existing priority has meant that vast sums of money have been poured into the provision of water for irrigation and much less for urban water supply, and that the direct competition for scarce water resources is frequently between irrigation for agriculture and water for the urban supply.

All of the major cities are served by systems which were largely constructed during the colonial era and which, through lack of maintenance, are in an advanced state of deterioration. Virtually no one in Delhi, Kolkata, or Chennai has a continuous supply but in Mumbai a large part of the services area receive water on an ongoing basis. Typically water utilities in India supply standpipes and taps in poorer areas and, when necessary, supplement this with tanker supplies. [60]

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[60] With water supply available for only for a few hours a day – or in some case - for a few hours every two or three days urban dwellers have developed coping strategies.

With a pump to draw the water out of the system quickly (and in doing so reducing water pressure elsewhere), and a tank to store the water in, the better-off can ensure a *de facto* 24/7 supply. If needs be they can also put in tube wells and pumps to supplement the municipal supply, buy water from tankers to top up the tanks, and purchase bottled drinking water. By such expenditures they ensure that there is, in fact, water available to them around the clock. However, the cost is well above what one would pay for a well managed, constant supply of municipal water.

For the poor, pumps and tanks are not options they can afford. In addition, the areas they live in are likely to be the worst affected by intermittent supply and low water pressures. In Delhi, for example, the standpipes on which many of

Water supply systems require operation at a constant pressure. Where there is intermittent water supply the constant pressure changes as water is pumped into the system, and then drawn down, causing a rapid deterioration to joints which then leak. This is not only causes high water losses but also sucks pollutants into the pipes through the leaking joints. At best these pollutants are mud and soil, at worst sewage. The effect is that even if water is adequately treated at the plant, the water coming out of the tap is not potable.[61]

AIR QUALITY

The Central Pollution Control Board (CPCB) is responsible for the monitoring and regulation of air quality in India.

CPCB operate 290 stations covering 90 towns and cities in India. In general there is a correlation between city size and the degree of air pollution although Mumbai, which is on the Arabian Sea, has better levels than Delhi, which is inland. The four largest cities, Delhi, Mumbai, Kolkata, and Chennai all suffer with severe air pollution. The principal pollutant of concern is suspended particulate matter (SPM) and PM-10. The source contributions to SPM and PM-10 are poorly understood due to the inadequacy of emission inventory and source apportionment data. An issue somewhat unique to India, however, is coal-fired power plant fly ash associated with the burning of poor quality coal mined in India. Funeral pyres are another unique emission source.

Air quality planning for Delhi is virtually nonexistent with no data on sources or apportionment of source. In the mid 1990s, Euro 1 vehicle emission standards were adopted after vehicle fuel quality standards were adopted. Vehicle maintenance was not good, and the Pollution under Control (PUC) private facility testing program had problems of technical competence and corruption. Today, the PUC program still fails to be a credible, useful program.

Industry and vehicles both play their part in pollution the air in urban areas but studies in Pune also point to road dust as a major pollutant together with agricultural burning.

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the poor depend, generally supply water for about four hours a day. With each standpipe supplying around 500 families, and pressure often low, filling of containers is a slow business; those who arrive in line late often find that they do not reach the water supply at all

The response to this is to get in line early and then spend a great deal of time in line waiting to collect water. With water in some areas likely to come on at night or early morning this is a real burden, a burden that is disproportionately borne by women and girls who are responsible for the water collection. In Chennai, where the problem is particularly acute, stories of women having to give up wage paying jobs in order to spend the day standing in line for water are common; equally common is the case of girls being denied schooling as they are needed to stand in the water line for hours each day.

[61] Low domestic tariffs are the norm for all of the water utilities in India. These represent a subsidy for the better off. In Delhi, the poor, who rely on public taps or tinkered water, get 25-30 l/c/d while those in high income areas get 380-400 l/c/d. Delhi has a World Bank funded Pilot Project through the Water and Sanitation Program (WSP). The Delhi Jal Board has selected two pilot areas in the city to try to bring onto 24/7 water and at the same time increase the tariff. Both of these areas are affluent. If the pilot works the intention would be to try to move the whole city onto a 24/7 supply with a realistic tariff.

In 2000 a group of NGO's filed suite with the Indian Supreme Court that addressed the poor air quality in Delhi. The Supreme Court ruled that polluting industries should be relocated outside of the city and a series of fuel, lubricant, and vehicle technology measures designed to reduce pollution. The Supreme Court has, therefore, become the *de facto* regulator for urban air quality in India.

In Delhi the measures it has introduced have included the relocation of industry, conversion of the diesel bus fleet to CNG, the banning of the sale of loose lubricant for use in 2-strokes, the progressive lowering of sulfur and benzene in gasoline and sulfur in diesel, the elimination of lead in gasoline, and mandating Bharat Stage II emission standards (Euro stage 2) for vehicles by 2001. The measures adopted in Delhi will be followed by other large cities in India.

The Delhi model of using the Supreme Court to mandate and enforce clean air standards has worked in India, with its independent Judiciary, and has attracted attention throughout the region, but the key is the independence shown by the judges and their willingness to play a proactive role in cleaning up air quality. This may not be replicable in those Asian countries where the Judiciary is subservient to the Executive.

Indonesia

OVERVIEW

Indonesia is the world's largest archipelago and, by population, the world's fourth largest country after China, India, and the United States. Indonesia was badly hit by the 1997 Asian crisis and has lagged behind the rest of Asia in its recovery. It has 27% of its population living below the poverty level.

Indonesia is a Republic with a President elected by direct popular vote (from this year). The president is both head of government and chief of state. The Armed forces have traditionally been heavily involved in political and social affairs in the country and, although this involvement is less direct today than it was in the past, they are still influential. Indonesia is dealing with ongoing low level insurrections in the island of Aceh and in Irian Jaya. There have been significant acts of terrorism in Jakarta and in Bali.

Indonesia has recently decentralized, giving greatly increased responsibility to the 30 Provinces and local government. The consequences of this are unclear at present although it should be noted that in some areas, such as the provision of urban water supply, the responsibility has always been a local one.

URBANIZATION

Jakarta is a mega-city that will reach a population of around 14 million people by the year 2025. Currently only a third of the population is connected to piped water and, at less than 2% of the population, Jakarta suffers from the lowest rate of sewerage connections of any major city in Southeast Asia.

PUBLIC HEALTH

Indonesia has the highest incidence of typhoid in Asia and suffers repeated local epidemics of gastrointestinal infection; the first leading cause of death in the country is diarrhea, which impacts mainly

upon infants and small children. It also suffers from some of the world's worst air quality with the sixth leading cause of death being inflammation of the respiratory tract. In Jakarta this accounts for 12.6% of all mortality, and is responsible for nearly half of reported morbidity cases.

WATER & SANITATION

Decentralization of government in Indonesia has placed water supply under local authorities whose next level of government is the provincial government. Central government is, therefore, two stages removed from any responsibility for the provision of urban water. For the capital area there is a Jakarta Water Supply Company which serves as a regulatory body; environmental regulation is the responsibility of the Jakarta Environmental Protection agency, while health regulations regarding water are the responsibility of the Ministry of Health.

Since 1998 two private companies PT Pam Lyonnaise Jaya and PT Thames Pam Jaya have operated the Jakarta water supply under 25 year concession contracts. NRW averaged 29% of production in 2001, down from 58% when they took the concessions. Staff per 1,000 connections is 5.3.

Jakarta's water supply comes from the Jatiluhur Water Reservoir. Although there are 13 rivers flowing through the city of Jakarta none are suitable as a supply source. But it is reported that in order to eke out supply the concessionaires are mixing canal water with the raw water supply. This canal water is little better than diluted sewage.

The extraction of groundwater, mainly by industry, has lowered levels in Jakarta by between 1 and 2.6 meters a year which has caused subsidence and seawater intrusion. A 2001 survey showed that 90% of shallow wells in Jakarta are contaminated by fecal coliform

There is around 51% coverage through household connections and public taps. This is up from 43% coverage at the start of the concessions. The remainder of the population rely on water vendors, supply at private operators water points, and wells. Vendors are able to charge 50 to 90 times the price of the municipal supply. Average per capita consumption of people on the piped system is 90 l/c/d.

There are no mandated standards for drinking water and there is no one monitoring the quality of water supplied by the concession holders. It is certainly not fit to drink but it might be minimally acceptable for bathing in.[62]

[62] At present there is little public awareness of the water quality – sanitation issue. Only 39% of the population has access to clean water in Jakarta and there is no apparent legal obligation for the government to furnish clean water to the public, nor is there a law requiring that water be provided to the entire population. The government does not want to provide piped water to informal settlements since to do so would provide encouragement to the poor so water is widely sold from vendor water trucks at enormous profit. Ground water is acceptable for many purposes but not for drinking and is sometimes supplemented with "black", highly polluted canal water.

There is little or no work going on to manage the total water resources of Indonesia even though deforestation, contaminated ground water, extensive agriculture use and expanding urban populations will make water supply – water quality a very important future issue. Further, the water distribution system in Jakarta is very leaky to the point that the entire water system needs to be re-engineered and rebuilt at a very high price yet there are no plans to do so. Professional, efficient management of the entire water resource system is needed in Indonesia which should reach crisis

Jakarta has a complex tariff structure that is set to subsidize the poor, but the poor are not connected to the system anyway. Tariffs for domestic water start at $0.04 m^3 rising to $0.39 m^3. Industry and commerce is charged at $0.58 m^3.

With virtually no houses connected to the sewerage system (which mainly serves modern high rise buildings) most people who have flush toilets rely on septic systems. Around half of the population of Jakarta, including most of the urban poor, relies on communal facilities and water courses.

The two concession holders are investing around $24 million a year on sanitation which is insufficient to connect the present population or meet existing demand. The effort that will be required to meet the demands of a population of 15 million people is almost certainly beyond the ability of the present organization to meet.

AIR QUALITY

The responsibility for the regulation of air quality is confused following the dissolution of the Environmental Impact Control body (Badepal) by President Megawati Soekarnoputri in 2002 and the decentralization of government. In theory the Office of the State Minister for Environment assumes the duties but it has not been given law enforcement powers.

In the 1990's UNEPS ranked Jakarta as the third most polluted mega city in the world after Mexico and Bangkok. Bangkok reacted to this with a determined (and successful) effort to reduce air pollution; Jakarta reacted by moving its pollution monitoring equipment to less polluted areas.

The Clean air Program (CAP) announced in 1991 is an effort by Jakarta to increase public awareness of air pollution. Under CAP, random emission tests were conducted by the Regional Environmental Authority (BAPEDALDA) and City Police between 1991 and 2000. In addition voluntary testing was carried out and cars that failed the test were serviced and tuned.

There are ten air pollution monitoring stations in Jakarta of which five are operational. The quality of the data generated is uncertain and government does not release it to the public. [63]

Not only is air pollution is a severe environmental problem it also imposes a high cost on the economy—by some estimates $400 million a year. Motor vehicles have been identified as the major source of the pollution but industry also plays a large role and forest fires, often resulting from large scale illegal logging, are also a factor imposing a burden not only on Indonesia but on its neighbors, particularly Singapore and Malaysia. Jakarta and Bali have phased out lead in gasoline but this is not yet

levels by 2010 in cities such as Jakarta. Government managers do not know what the public health risks are, what the economic consequences may be to the economy of the nation or what needs to be done to solve these problems.

[63] Air quality monitoring & air pollution index development. There are 5 new continuous air monitoring stations in Jakarta for a total of ten but several of the older stations are no longer in operation. Quality of the data and availability of the data is uncertain. Swisscontact would like to sponsor development and daily release of an air pollution index but has not yet been able to acquire the necessary air monitoring data. They are also working with Osaka University on a project to interpret and report emissions and air quality data.

Indonesia-wide. The problem is that Pertamina, the state owned oil company, lacks the funding to upgrade an additional refinery to increase its production of unleaded fuel.

Although the government estimates that about 70% of the air pollution (all pollutants) comes from transportation sources, only 50 vehicle inspection stations are active in Indonesia and most of these are infrequently operated, are not well organized, and no enforcement occurs. The national regulations on air quality adopted in 1993 have not been implemented and the decentralization of the environmental programs to the local level has resulted in a uniform lack of capacity.

Regulation and enforcement is weak. Vehicle emission testing depends upon the private sector and emission certificates are issued without testing. It has not yet proved possible to reduce or eliminate the number of 2-stroke engines on the road and the one attempt to run a bus line using CNG buses fell foul of a deal by which second hand diesel buses were purchased instead.[64]

CONCLUSIONS AND COMMENTS

Indonesia has some of the worst air pollution in Asia; getting lead out of gasoline in Jakarta and Bali is one step towards addressing this problem but a great deal more needs to be done if a major impact on air quality is to be made. Like other Asian countries, enforcement programs are weak, technical capabilities are inadequate, and air quality management capabilities are inadequate.

On urban drinking water it is clear that Jakarta will need to do a great deal more to have any hope of meeting present, much less future, demand. On sanitation, there is limited effort being made to address the problem.

Nepal

OVERVIEW

Nepal has a population of about 25 million with 42% living below the poverty line. Its per capita GDP is $242 with an annual growth rate of 2.6%. About 80% of the population depends on agriculture, which accounts for 40% of the GDP. An on-going Maoist insurgency became more intense in late 2001 resulting in a significant drop in tourism, which is a major source of foreign exchange. For various reasons exports of carpets, pashmina shawls, and textiles have dropped during the past few years. Remittances from abroad are increasingly more important to the economy. Perhaps as many as one million Nepalese work abroad in countries such as Japan, South Korea, Thailand, the Philippines, and the Middle East. In many rural areas seasonal work laboring in India is the norm. The major natural

[64] The CO ambient air standards are commonly exceeded in Jakarta but that PM-10 and ozone were the biggest problem. They estimate that about 60% of the PM emissions are transport-related. For all pollutants, about 70% of the emissions are from mobile sources. Links to transport planning are weak and fuel adulteration is a problem as kerosene is often added to gasoline to reduce operating costs. 2-stroke vehicles have until 2007 to meet Euro I standards.

resource of Nepal is hydropower, but only 600 MW of the estimated potential of 44,000 MW has been developed so far.

GOVERNANCE

Nepal is the only country in the world that is a Hindu constitutional monarchy. A parliamentary democracy came into effect in 1990. However, in October 2002 the King applied Article 127 of the Constitution, sacked the Prime Minster, and selected and appointed his own cabinet. Elections have been promised in the near future, but cannot be held until the security situation improves.

The ethnic composition of Nepal is diverse with 75 groups speaking 50 different languages. Men from the Brahmin and Chetri castes dominate government and business.

URBANIZATION

Only 15% of Nepal's population is urban. There is one metropolitan city (Katmandu), and four sub-metropolitan cities (Lalitpur, Pokhara, Birgunj, and Biratnagar). The sub-metropolitan cities have populations of about 100,000. Katmandu and Lalitpur form a single metropolis within the Katmandu valley and are rapidly expanding and merging with outlying towns such as Kirtipur and Timi. The Katmandu valley floor, covering 400 km^2 is perceived as being much safer than rural Nepal, and an estimated 300,000 people have fled to Katmandu and its environs in the past 3 years, thus swelling the valley's population to an estimated 1.5 million.

PUBLIC HEALTH

Infant mortality is high at 69 per 1,000 live births and life expectancy is 59 years. Nepal is one of the few countries in the world where the life expectancy of women is slightly lower than that of men. There are less than 4,500 registered doctors in the whole country. Health posts, even within the Katmandu valley, are under-equipped, and often have no staff other than a cleaner. Outbreaks of cholera and other water borne diseases are so common that they rarely make front page news in the national dailies. One hospital in Katmandu reported that 16.5% of all deaths were due to water-borne diseases. In 1998 11.6% of total outpatient visits were for respiratory diseases.

WATER & SANITATION

The legislation to control water pollution includes:

- The Water Resources Act (1992) and Regulations (1993)
- The Solid Waste Act (1987) and Regulations (1989)
- The Environment Protection Act (1997) and Regulations (1997)

The government's Tenth Plan (2002 – 2007) includes setting standards for water pollution and to ban the connection of drainage systems to rivers.

The Nepal Water Supply Corporation (NWSC), under the Ministry of Physical Planning and Works, is responsible for water supply and sanitation in 28 municipalities in Nepal. It is supported by the World Bank's Urban Water Supply and Sewerage Project.[65]

NWSC uses 24 surface water sources around the valley rim and 37 tube wells for its water sources. Many people still use ancient stone spouts, fed from springs, for drinking water, as well as for bathing and washing clothes. However, the increasing exploitation of underground water by tube wells and shallow tube wells has led to the decrease of water in the stone spouts. Almost 30% of the groundwater withdrawn from the Katmandu valley is from private wells.

Urban access to improved drinking water[66] dropped slightly from 94% to 93% between 1990 and 2002, whereas urban household connections rose from 42% to 48% during this period. NWSC currently supplies 80 million liters per day to 225,000 households during the dry season and 120 liters per day during the rainy season. NWSC distributes through 7 supply systems. There are about 100,000 connections and 1,300 public taps. The estimated demand is 160 million liters per day. In most of the Katmandu Valley NWSC water supply is intermittent during the rainy season and often non-existent during the dry season. People, mainly women and children, must spend many hours waiting for their turn at public taps and government water tankers. Many institutions, industries, and hotels have their own tube wells which extract about 20 million liters per day. Hotels and houses with large underground tanks purchase water from tankers during the dry season.

A study by the Ministry of Health in 2004 found that 75% of the water supplied by NWSC was contaminated with coliform bacteria, iron, ammonia and other contaminants (UNEP 2001). Water from traditional stone spouts is also contaminated with nitrates and ammonia.

[67]Urban sanitation coverage rose slightly from 62% in 1990 to 68% in 2002[68]. There are 170 km of sewers. About 34,000 houses have sewer connections. In 2000 there were only four lagoon-type treatment plants with a combined capacity of 19 million liters per day. However, 95% of their capacity was not operating. In addition, farmers intercept sewage to run it onto their fields. In 2000 a new plant with capacity for 17.3 million liters per day was under construction. Domestic wastewater from the areas not covered by NWSC is discharged directly into rivers and streams.

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[65] The new Melamchi Water Supply Project (MWSP) is an inter-basin water supply project which could be completed by 2010 and provide an additional 170 million liters of water per day to the Katmandu valley. It will cost 500 million dollars and is financed by ADB, NORAD, JBIC, SIDA, NDF, and OPEC.

[66] Includes household connection, public standpipe, borehole, protected dug well, and rainwater collection: WHO and UNICEF, 2004

[67] About 75% of NWSC connections are metered, but half the meters do not work. User charges covered only 84% of NWSC's operational expenses in 2000. Bill collection efficiency runs at 70%. Currently consumers with un-metered taps pay $4.42 per month for water and sewerage services. Consumers with meters pay approximately $0.13 per m^3. The government is considering raising the tariff by 15%. The government is preparing to stop distributing free drinking water through the public water taps. MWSP will provide community stand pipes only in those areas where local consumers' groups take responsibility to pay the tariff regularly.

[68] Includes connection to public sewer, connection to septic system, pour-flush latrines, and ventilated improved pit latrines: WHO and UNICEF, 2004

AIR QUALITY

The legislation to control air pollution includes:

- The Industrial Enterprises Act (1992)
- The Vehicles and Transport Management Act (1993)
- The Nepal Petroleum Producers Act (1993)
- The Nepal Mines Act (1996)
- The Nepal Vehicle Mass Emission Standard (2000)
- The Nepal Ambient Air Quality Standard (NAAQS) (2003)
- The Environment Protection Act (1997) and Regulations (1997)

The government's Tenth Plan includes setting standards for air pollution and involving local bodies in environmental awareness campaigns. The municipalities will be the authorities to issue compliance certificates for vehicles.

The concerned agency for air quality is the Ministry of Population and Environment (MOPE). MOPE records the particulate matter (PM10) at six monitoring stations daily. The results are published weekly in the national press and post on MOPE's Website. In downtown Katmandu dry season values have reached 446, which are considered "hazardous" and well above the government's standard of 120.

During the dry season heavy smog hangs over the Katmandu valley. The main sources of air pollution are diesel and gasoline[69] vehicles, brick kilns, re-suspended road dust, kerosene cooking stoves, and refuse burning.

Fuel quality is monitored by the Nepal Oil Corporation. Three stations test vehicular emissions. Two are run by the traffic police and one by the Department of Transport Management. Most vehicles fail their tests but have a 3 month grace period to comply.

CONCLUSIONS AND COMMENTS

Nepal has made some progress in reducing mobile emissions; lead was removed from gasoline in 1999 and three wheeled 2-strokes were banned from the Katmandu valley from the same year. There are now nearly 1,000 electric or LPG vehicles in the Katmandu valley.

[69] Commercially sold gasoline is adulterated with kerosene.

Philippines

OVERVIEW

Over the past 50 years the country is no longer one of the richest countries in the region, as their economy has stagnated, and other countries have moved forward. This resulted in part from the perception of political instability and an economic policy that largely closed the country to foreign investment. The economy is now opening up but still looks uncompetitive compared with many of its neighbors. This resulted from the perception of political instability and an economic policy that largely closed the country to foreign investment. The economy is now opening up but still looks uncompetitive compared with many of its neighbors.

The country is a Republic with a representative democracy modeled on the American system. It has a presidential system of government with a bicameral legislature and an independent judiciary

URBANIZATION

With a high population growth rate of 2.36%, and an inability of the rural sector to generate jobs, urbanization will accelerate in the country with Manila being the urban area of choice for many of these rural-urban migrants. By 2015 Metro Manilas population will have reached 15 million, up from 10 million in the year 2000.

PUBLIC HEALTH

Over 40% of Filipinos live on less than $2 a day. Infant mortality rates are 49 per 1,000 live births and maternal mortality runs at 60 per 100,000 births. Cholera is a problem and fecal coliform contamination of drinking water a major issue. Dengue fever is also endemic with some 23,000 cases year of which 10% are fatal.

WATER & SANITATION

Urban water and sanitation is the responsibility of local government. Central government has just (March 2004) passed a "Clean Water Act" for which the implementing rules and regulation are currently being drafted. One organization that is seen as a model of competent water resource management, professionalism, and community involvement is the Laguna Lake Development Authority (LLDA).

The Manila Metropolitan Water and Sewerage System (MWSS) was turned over to two private concessionaires in 1997. At the time it was widely hailed as the largest "privatization" of a water authority ever carried out. The service area was divided into two zones, the east zone is a consortium led by the Ayala Corporation that contains Bechtel and Mitsubishi; the west zone is a consortium led by Benpres Holdings.

The basis for economic regulation is the concession agreement between MWSS and the two private operators. There is no official government policy that is used as the basis for contract or regulation so, essentially, it is regulation by contract.

The privatization does not appear to have led to any great gains in efficiency with Non revenue water at a massive 62% although collections for the other 38% are at 97%. Staff per 1,000 connections is 4.4.[70]

98% of the water supply for Metro Manila is from surface water sources, mainly the Angat and Umirat Rivers. Ground water in the Metro Manila has, in the past, been over pumped leading to contamination from saline intrusion. In general, in the Philippines, deforestation of catchments is leading to water supply problems.

Less than 60% of the population receive piped water; of these 88% receive water 24/7. Close to a quarter of the Manila population receive water from SSWPs at a cost per m^3 of around 15 times that of the municipal supply. Around 5% of the population gets water from small scale private operators who operate their own deep tubewells and small distribution networks.

There is no effective monitoring or regulation of water quality.

In 2001 the average domestic tariff was \$0.12 m^3 with the non-domestic tariff at \$0.16 m^3. Throughout 2001 and 2002 the concessionaires sought tariff increases. At the end of 2002 tariffs were adjusted and now run from \$0.25 m^3 to \$0.50 m^3.

Only 7% of people in the service area have access to the sewer system. Most people rely on septic systems with effluent being discharged to storm drains. The concessionaires have, to date, made little or no investment in sanitation.

AIR QUALITY

The responsibility for clean air rests with the Department of Environment and Natural Resources (DENR) which exercises its mandate through the Air Management Board. An Air Quality Monitoring and Training Center was completed and opened this year and a technical secretariat to advise the Air Management Board will commence work in December 2004. There is testing of vehicle emissions through 400 private test centers, but most of them will issue a certificate without testing, on receipt of a payment.

[70] The twin benefits normally ascribed to privatization: greater investments and improved efficiency, if measured by piped service coverage and NRW, have not been realized in Manila. There are two probable reasons for this, the first being the lack of a clear government policy regarding urban water supply, particularly as it affects the poor. This lack of policy meant the signing of contracts that lacked clear and meaningful conditionality directed towards improving the coverage of the system. The second reason is that the business model assumed by donor agencies and government is that of the private sector investing heavily in improving the system – whereas, it is doubtful that the private sector is working with a model that involves major capital inflows from its own resources.

DENR has nine air quality monitoring stations operating in Metro Manila. The ADB had a large Air quality program in Manila which ran until 2003 but was, at best, only a limited success. Much of the equipment purchased under the program for monitoring etc. has not been used.

Burning of waste, 2-stroke and diesel emissions and pollution from industry located within the Metro area are all major contributors to air pollution; but it is vehicle emissions that are thought to be responsible for 70% (all pollutants, annual average) of the pollution within Manila. The 70% estimate is, however, known to be subject to question. Particulate (SPM and PM10) are the principal pollutants of concern.

Within the Philippines there is no active move to substitute CNG as a fuel for public transport although the idea has been mooted by some NGO's.

Lead was banned from gasoline three years ago. There are efforts underway to persuade 2-stroke taxis to convert to 4-stroke engines but costs are a problem heavily polluting diesel buses are also a problem. Buses are old and are fitted with imported rebuilt diesel engines which are heavily polluting. Fares are regulated, and are so low that operators have no money for preventive maintenance or replacement of the older buses.

Corruption and vested interests are the major impediment to cleaning up air in Manila. The vehicle emissions inspections are a waste of time because of corruption; attempts to deal with the problem of old, heavily polluting, diesel buses is stymied because the Philippine army owns many of the bus companies – and so it goes on. To many observers Philippines is on a slow downward spiral in virtually all areas, urban air quality is just one of these areas.

CONCLUSIONS AND COMMENTS

The Philippines does not lack capacity, it produces many competent technical people and managers, but a large number of them look overseas for opportunity. The Philippines problem is one of governance – this is reflected in every area, including that of addressing the urban environmental problems of air quality and the supply of clean drinking water and sanitation.

Pakistan

OVERVIEW

Pakistan has a population of 160 million. Its per capita GDP is $520 with an annual growth rate of 5.4%. 33% live of the population lives below the poverty line.

GOVERNANCE

Pakistan is a Federal Republic. Pakistan's constitution is currently suspended, and is governed directly by the administration of the Chief Executive, President Pervez Musharraf.

URBANIZATION

34% of Pakistan's population is urban. The annual urbanization rate is 4.5%. There are 66 urban areas[71] in Pakistan. The largest is Karachi with a population 11 million, followed by Lahore with 6 million.

PUBLIC HEALTH

Infant mortality is 74 per 1,000 live births and life expectancy is slightly less than 63 years. The source of most water-borne disease is human excreta. The National Conservation Strategy estimates that almost 40% of all deaths are related to water-borne diseases.

URBAN WATER & SANITATION

Policy, governance and regulatory framework

Federal and Provincial governments are responsible for the policy and legal framework. Under the current government, a devolution plan was instituted all over the country with a view to addressing municipal issues like water supply. The district and city councils have been allocated funds for municipal development, but there are serious questions about the structure and their ability to deliver.[72]

The water authorities

At the federal level the concerned agency is WASA (Water and Sanitation Authority). The Karachi Water and Sewerage Board is a semi-autonomous government agency responsible for water and sanitation in Karachi.

Water sources

Karachi's water supply comes from the Indus River (93%) and the Hub River (7%). Groundwater accounts for less than 1% of the city's water supply.

The distribution system

Urban access to improved drinking water[73] in Pakistan stayed at 92% between 1990 and 2002, whereas urban household connections dropped from 61% to 50% during this period. The KWSB supplies 2,193,182 m^3 daily through 1,283,200 connections to about 58% of a population of 11 million. Small scale vendors supply water to another 20% of Karachi's population.

[71] Population of 100,000 and above.

[72] Arif Pervaiz, IUCN, *in litt.*

[73] Includes household connection, public standpipe, borehole, protected dug well, and rainwater collection: WHO and UNICEF, 2004

Water quality

The ADB[74] reports that Karachi's ground water supply sources are relatively unpolluted and only require chlorination and filtration. On the other hand, WWF[75] paints a very different picture. Discharging untreated sewage and chemical wastes directly into rivers, lakes and drains is the norm. Most main sewers are made of 10ft cement sections linked without proper safety seals. Poor connections combined with deteriorating low quality sewer pipes result in leakage. The outflow from the sewers mixes with the water table and the contamination is carried to deeper levels. Hence the ground water which is considered safe becomes adulterated with everything from PCBs, lead, cyanides, mercury, solvents, hydrocarbon compounds, hospital and pharmaceutical industry waste. Water in Karachi is so contaminated that almost all residents boil it before consuming it. Because sewerage and water lines have been laid side by side in most parts of the city, leakage is the main cause of contamination.

Tariffs

Residential tariffs are $12.93 per month for the first floor, with a surcharge of 50% for each additional story. The monthly tariff for apartments is $18.75. Metered supplies per m^3 are $0.16 for residential and $0.26 for industrial and commercial. The provincial government regulates tariffs.

Sanitation

Urban sanitation coverage in Pakistan rose slightly from 81% in 1990 to 92% in 2002[76]. In Karachi 50% of the population is connected to sewers. About 30% of wastewater is treated; the remainder is discharged untreated into the sea through open drains.

AIR QUALITY

Policy, governance and regulatory framework

Since the promulgation of the Environment Protection Act 1998, and the National Conservation Strategy in 1992, the government has:

- Established motor vehicle emission standards and strengthened the Motor Vehicle Examination system in the country.
- Constituted Environmental Squads of traffic police at federal and provincial levels.
- Started setting up 15 tune-up stations for gasoline and diesel vehicles and establishing a revolving loan of $3 million to encourage installation of additional tune up stations by the private sector.

[74] Water in Asian Cities, ADB, 2004

[75] Hania Aslam, WWF – Pakistan, *in litt.*

[76] Includes connection to public sewer, connection to septic system, pour-flush latrines, and ventilated improved pit latrines: WHO and UNICEF, 2004

- Set up an incentive scheme whereby about 150,000 gasoline vehicles have so far been converted to CNG.
- Begun a lead and sulfur phase out program for providing clean fuels.
- Started implementing of industrial emission standards.

REGULATORY AUTHORITIES

The Pakistan Environment Protection Agency (PEPA), under the Ministry of Environment, is the statutory body responsible for enforcement of EPA98. In 2002 the Pakistan Environmental Protection Council established the National Environmental Quality Standards (NEQS), which prescribes the maximum emission limits. A system of self-monitoring and reporting is being implemented for the industrial sector.

Air pollution monitoring

Up until now lack of funds and trained staff has prevented systematic monitoring of urban air pollution. The available information is based on "one-off" surveys using mobile units. The most recent was carried out by PEPA and JICA during 1999-2000 in Lahore, Rawalpindi, and Islamabad in 1999-2000.

Extent of air pollution and source

Pakistan's carbon emissions in 1998 had risen to nearly 27 million tons. Most air pollution comes from industry (45%) and transportation (27%), while the remainder is from residential (22%) and commercial sources (6%). In urban areas buses, motorcycles, and motorized rickshaws are major sources of pollution. Domestically produced fuel has high sulfur content. Fuel and lubricants are adulterated and this compounds the problem. Industrial units within urban areas use high sulfur content diesel and furnace oil. Industrial and vehicular emissions combined with air blown dust from brick kilns and unpaved roads have resulted in winter smog occurring frequently in Lahore.

Enforcement

Environmental squads of the federal and provincial civilian police monitor vehicular emissions.

OVERALL CONCLUSIONS AND COMMENTS

The profile of Pakistan is similar to that of other countries in South Asia.

One success story is the Orangi Pilot Project[77]. Established in 1980, it is the Pakistan's most successful urban development program. Orangi is Karachi's largest unplanned settlement and has a population of 1.2 million. The OPP is a research institution whose objective is to analyze outstanding problems of

[77] Source: Arif Pervaiz, IUCN, *in litt.*

Orangi, and then through action research and extension education, discover viable solutions. These solutions are then applied, with modifications where necessary, to other settlements and become part of state policies. The OPP does not fund development but, by providing social and technical guidance, it encourages the mobilization of local resources and the practice of co-operative action. Based on these principles, the OPP has evolved a number of programs:

- The Low Cost Sanitation Program is managed by the OPP-RTI. It enables low-income families to construct and maintain an underground sewage system with their own funds and under their own management. For this program, the OPP provides social and technical guidance (based on action research), tools and supervision of implementation.
- The Family Enterprise Economic Program is run by the Orangi Charitable Trust, which was formed in 1987. The OCT borrows from commercial banks and then lends to small family businesses but without red-tape and collateral. These loans vary between $17.00 and $1,290.00. The aim of these loans is to increase production and generate jobs.
- The OPP's Low Cost Housing Program provides loans and technical assistance (based on research) to building component manufacturing yards in Orangi so that they can mechanize their production, improve their products, train their staff and increase their production. In addition, the program trains masons in using the new technologies and components that are being developed at the manufacturing yard.

Sri Lanka

OVERVIEW

Sri Lanka has a population of just fewer than 20 million people with the one major area of urbanization being the greater Colombo area with a population of around 3.5 million. Its per capita income is higher than most other countries in South Asia at $880 with an economy that is growing at around 5% p.a. Despite this growth rate, 25% of the population lives below the poverty line. The country is just coming out of 20 years of civil war which has dominated the attention of both government and donors and has done little to encourage private foreign investment. In spite of this, the economy has shifted from one where the economy was dominated by agriculture, particularly plantation crops, in the 1970's to one where today agriculture accounts for less than 20% of the economy with industry accounting for 25% and services 55%.

Sri Lanka is a republic with a strong democratic tradition. The President is both the chief of state and the head of government. The country is ethnically and culturally diverse with the two major ethnic groups being Sinhalese and Tamil with the Sinhalese forming the majority. For twenty years the Tamil, who have historically been settled largely in the North and East of the country, have fought for separatism. In 2002, with the Norwegian Government as facilitator, the two sides agreed to a cease fire and negotiations. The peace talks are continuing at this time.

URBANIZATION

The Southwest of the Country is he most densely urbanized area with Colombo as its core. Twenty years of unrest and the resulting insecurity have mitigated against other cities, such as Jaffna, developing. Virtually all commerce and industry is centered on Colombo as well as the countries major port. With an urban growth rate of 2.6% a year, the urban area is expanding but, so far, although Colombo has some very poor areas, it does not have the extensive slums seen in many South Asian cities.

PUBLIC HEALTH

Sri Lanka has always understood the importance of investing in human capital and that has given it public health indicators that are the best in South Asia with infant mortality rates at 17 deaths per 1,000 live births and a life expectancy of 73 years. Within the overall population, 55% have access to sanitation and 61% to safe drinking water.

WATER & SANITATION

The National Water Supply and Drainage Board (NWSDB) is the government corporation that manages Sri Lanka's water supply, drainage and sewerage. It is both the provider and the regulator.

Government has set goals of 85% of the population having access to safe and adequate drinking water by 2010 and 100% of the population having such access by 2025. On sanitation - the figures are 70% by 2010 and 100% by 2025.

The NWSDB is generally seen as one of the more competent water authorities in South Asia with a technical staff who are fairly well trained and technically competent. Management suffers from being part of the Government service. Overstaffing is a high, with a rate of 7.6 staff per 1,000 connections.

Government is encouraging the private sector to enter partnerships with government and in 2001 some pilot concessions were signed.

The greater Colombo area is supplied from the Labugama and Kalatuwawa impounding reservoirs and the Kelani Ganga (River). The sources are threatened by two problems, the first is the untreated industrial effluent flowing into the Kelani Ganga and the second is sand mining in the rivers, which is leading to salt intrusion. A scheme is under discussion to bring in water from the Kalu Ganga, South of Colombo. This would involve some major engineering and an inter-basin transfer.

Groundwater is not a major contributor to the urban water supply although there are some private drilled wells.

The Greater Colombo Area is reasonably well covered by the NWSDB system with around 66% of the population served with piped connections and 26% by standpipes. There are no SSWPs. NRSDB claims that around 60% of the people with piped connections get a 24 hour supply; users say that the figure is much lower than the 60% claimed.

Average domestic consumption is around 119 l/c/d. Non revenue water is high at 55%.

Water quality is adversely affected by deficiencies in the distribution system caused by the inability to run the system at pressure at all times coupled with inadequate maintenance. This leads to treated water being polluted within the distribution system

A five tier tariff system is run for domestic water starting at $0.013 m^3 up to 10 m^3 a month, and rising to $0.483 from 20 m^3 a month. The non-domestic tariff runs from $0.451 to $1.503 m^3. With non-domestic use consuming 20% of the water supplied, and paying close to three quarters of the annual revenue, there is a huge cross-subsidy of domestic water by the commercial and industrial sectors.

Within the greater Colombo area there are just 33,000 sewer connections. Most people rely on septic tanks which tend to overflow as desludging is rarely done.

AIR QUALITY

Colombo, with its location on the coast, has less of an air quality problem than many major Asian cities but it has little cause for complacency. Vehicular emissions have been identified as the major cause of poor air quality and the main efforts at present are directed towards the reduction of these emissions.

The responsible environmental authority for air quality in Sri Lanka is the Central Environmental Authority. The World Bank has just completed a capacity building project in the authority and this is presently continuing under funding from a grant from the Netherlands.

The implementing authority for the reduction in vehicle emissions is the Ministry of Transport. With 34 vehicles per 1,000 people Sri Lanka has the highest number of vehicles per head of population in Asia. The government has set targets for vehicular emission control in greater Colombo. These are Euro 2 standards by 2006, Euro 3 by 2010 and Euro 4 by 2015. These standards do not include diesel trucks and buses nor do they include 2-stroke engines.

The Ministry of Transport would like to see 2-stroke engines included in the emission regulations. Three wheeled taxis are ubiquitous in Colombo and are a major source of pollution, but the importer of these 2-stroke vehicles from India has sufficient political influence to keep them outside of regulation.

The monitoring of air pollution is the responsibility of the Air Resource Management Centre (AIRMAC). Their responsibilities include the production of technical analysis for air regulation as well as monitoring. The staffs at AIRMAC is technically competent and committed but are stretched very thin. Currently they maintain one permanent monitoring station in downtown Colombo and also have one mobile station. Current monitoring indicates that vehicular emissions are the primary cause of poor air quality in Colombo.

Vehicle testing has been made the responsibility of the private sector, with little provision for control or supervision by the Ministry of Transport.

CONCLUSIONS AND COMMENTS

Urban air and water problems are not as severe in Colombo as they are in many cities of South Asia. This is a function of the relative lack of informal settlement, the higher per capita income levels, and past

investment in infrastructure. However, to keep up with the growth of the Greater Colombo area, and to meet government targets, major investments will need to be made in water supply and even larger one in sanitation

Government is making attempts to regulate mobile sources of air pollution but with 2-stroke engines and diesels outside of the regulation the improvements are going to be limited.

The one real success story in urban environmental clean up is not in air, or water and sanitation, but in solid waste. A private investor - BEL Ltd. – has set up a Composting Facility at Sedawatte with $(US) 6 million of local funding. TA from the University of Minnesota is being provided, as well as support from US-AEP. The facility is taking approximately one third of Colombo's' solid waste, separating it and composting. The separated solids and then put into a sanitary landfill. Within 2 years it hopes to be taking all of Colombo's' solid waste. The compost is being mixed with chemical fertilizer and then sold as "Tea mixture" or "Paddy mixture" and is finding a ready market amongst farmers.

Thailand

OVERVIEW

With a per capita income of $7,400[78] Thailand is amongst the middle income countries of Asia. It was badly hit by the 1997 Asian economic crisis but its growth rate has bounced back and is now running at around 7% p.a. Together with the growth and relative prosperity has come some major environmental problems which the country is now beginning to address. Thailand passed its first Environmental Protection Law in 1992 heralding the dawn of environmental awareness in the country. This was strengthened in 1997 with the requirement that there be an EIA carried out and the public consulted where large infrastructure projects are proposed.

Thailand is a constitutional monarchy with an elected bicameral assembly and a Prime Minister as head of Government. The present Prime Minister, a telecommunications multi-millionaire has strong pro-business leanings which causes disquiet amongst some environmentalists. In terms of enforcement of environmental regulation, the 2002 Environmental Sustainability index rated the country 46th out of 56 countries.

Environmental issues are the responsibility of an apex body, the National Environmental Board. The Ministry of Science, Technology and Environment (MoSTE) is responsible for environmental policy and planning and comprises the: Office of Environmental Policy and Planning; Pollution Control Department; and Department of Environmental Quality Promotion. Recent decentralization of government has moved enforcement responsibility to the provinces which are too ill equipped and understaffed to discharge the responsibility.

[78] At purchasing power parity (PPP)

URBANIZATION

The Bangkok Metropolitan Region (BMR) is the largest urban conurbation in Thailand and the center of both commerce and industry. It has been estimated that this area generates 60% of Thailand's GDP. It has major air quality problems and lacks adequate water supply and sanitation. The population of this region is expected to top 10 million people by 2025.

PUBLIC HEALTH

In Bangkok, 1,000,000 people suffer from allergies and respiratory problems due to air pollution. In 2000 airborne particulate matter is estimated to have caused 4,550 premature deaths and have led to 17,000 hospital admissions.

The quality of the rivers and other water bodies on which the Thais rely for water have deteriorated with consequent health impacts. Diseases resulting from contaminated water including diarrhea, dysentery and typhoid impose a health care cost of around $25 million a year.

WATER & SANITATION

The Metropolitan Waterworks Authority (MWA) is responsible for water supply in the Bangkok Metropolitan Region and is answerable to the Bangkok Municipal Administration (BMA) The Department of Drainage and Sewerage (DDS) of BMA has the responsibility for sanitation and waste water. Standards for drinking water are set by the National Environmental Board.

MWA is a reasonably well run authority that provides 24/7 water to domestic consumers and business in the BMR. NRW runs at around 30%.

Thailand is suffering from increased levels of industrial wastewater, a dramatic rise in untreated domestic sewerage and severe degradation of its waters. On top of this, deforestation of catchments has led to increased soil erosion which in turn has meant increasing turbidity and declining flows in many of its rivers. The Pollution Control Department reports that only 14% of surface water is suitable for human consumption. Water pollution is most severe in the lower reaches of the Chao Phraya and Tha Chine – that is the Bangkok Metropolitan Region. This is due to industrial and agricultural pollution and the discharge of untreated sewerage.

Industry in BMR has typically relied upon groundwater for its source for water. This has led to severe depletion and land subsidence which could become a major economic cost.

85% of the population in the BMR is connected to the urban water supply. Those not connected are in informal settlements where connection is not made as it is seen as conferring legitimacy on the dwellers in these settlements.

BMR claims that it produces water from its treatment plants that meets drinking water standards. The high incidence of gastro-enteric ailments would seem to bring this claim into question and most consumers within the BMR prefer to rely on bottled water for drinking.

Private houses in Bangkok are required to have septic tanks, however much of the effluent finds its way into public drains and into the *klongs* (Canals) and eventually into the Chao Phraya River. There are six wastewater treatment plants in the BMR.

The sewerage system is under-funded due to the belief that there is an unwillingness to pay for sewerage disposal; it is not clear that this is true, but there is certainly an unwillingness to charge; this has resulted in poor O&M at sewerage treatment plants. Bangkok has six operational wastewater treatment plants and there are twelve smaller community wastewater treatment plants that are also run by DDS.

AIR QUALITY

The Thai government has taken, and continues to take, steps to deal with air pollution in Bangkok. Leaded gasoline has been phased out and ambient led levels plummeted as a result. Today they are one twentieth of the levels they had reached in 1991. Dust and carbon monoxide levels have also fallen. Particulate problems remain with rising PM_{10} concentrations.

The MoSTE has initiated a plan to target smoke belching diesels and a law is about to be promulgated requiring low sulfur content in gasoline.

The Pollution Control Department and BMR do a reasonable job of monitoring its air pollution and makes the information on air quality available. Vehicle emissions are not the only source of air pollution. In Mae Moh, 13 lignite power plants with an installed capacity of 2,600 megawatts are major sources of sulfur dioxide. The Electricity Generating Authority of Thailand has been now installed scrubbers on these plants which have led to some improvement. Although the PCD has the responsibility of regulating industrial emission sources, they do not now have authority to require or enforce plant operating permits. Efforts are being made to rectify this matter.

The enforcement of environmental regulation in Thailand is far from perfect, but air quality has improved measurably in Bangkok so, it would appear to be having some impact. Air quality problems remain, however in Chang Mai and other Thai cities.

Vehicles numbers are increasing by 500 a day in Bangkok so it is going to be an uphill battle to maintain, let alone improve air quality standards. The reduction of particulates will require action on diesel vehicles which is the next issue for government to address.

CONCLUSIONS AND COMMENTS

The first steps have been taken in dealing with the rapid deterioration in the water bodies on which Bangkok relies for its water supplies. A River Basin Management Committee has been set up for the Tha Chin River Basin. The River is the most polluted in Thailand and one of the sources of drinking water for BMR.

Initial steps would seem to indicate that the Authority is facing real problems with enforcement. Pig farms are a major polluter of the river, but enforcement efforts have fallen foul of the farmers lobby and its support by politicians.

Vietnam

OVERVIEW

Vietnam has a population of 80.7 million. Vietnam's per capita GDP is $485 (2003) with a growth rate averaging 6.1% between 1990 and 2003. Inflation is at 3% and the Vietnamese currency has only devalued by 27% since 1995. In spite of a trade deficit, Vietnam's foreign exchange reserves tripled between 1995 and 2001. This was in part due to yearly declared remittances of $2 billion from overseas Vietnamese. It is estimated that an additional $2.5 and 4 billion enters the economy through undeclared sources.

Vietnam is a one-party communist state rapidly transitioning from socialism to a mixed economy.

After the war ended in 1975, the economy crashed as Hanoi implemented socialist policies and collectivization in the south. For some 15 years the country was virtually isolated from the rest of the world, depending on the Soviet Union for aid. With the collapse of the Soviet Union, the Vietnamese government introduced a series of *doi moi* (renovation) reforms which began to attract foreign investment. The US trade embargo ended in 1994, and relations were normalized in 1995. In the late 1990s the GOV realized that there was a large parallel black-market economy. Their response was to legalize it and to allow Vietnamese nationals to have US dollar accounts from which they can withdraw dollars in cash. For the past few years a growing middle class with disposable income has further spurred the economy, especially in the south.

Vietnam is predominantly Buddhist, but in Southeast Asia it ranks second only to the Philippines with its population of Roman Catholics. The *Kinh* make up 85% to 90% of the population. Other ethnic groups, collectively referred to as *montagnards* in the US, are found in the highlands. During the 1970s and 1980s several million settlers from the north migrated into the areas historically occupied by these groups.

URBANIZATION

About 25% of Vietnam's population is now urban. Rapid urbanization and industrialization are taking place in the south. Between 2000 and 2002 there were 210,000 new jobs created in the four provinces around Ho Chi Minh city, which is three times the number of jobs created in the northern seven provinces which have double the population. In 2003 the exports per capita in the southern four provinces were $785 against $50 for the northern seven. HO CHI MINH CITY, with an official population of about 6 million inhabitants, is the largest urban area in Vietnam and growing at a much faster rate than Hanoi and Haiphong. There is a four tiered administrative system (central, province, district, and commune/ward). Officially, Vietnamese citizens require a permit from the local authorities to reside in any area. However, perhaps as many as 1.5 million workers are illegal residents in HO CHI MINH CITY. Ho Chi Minh City is now the most polluted city in Vietnam.

PUBLIC HEALTH

Infant mortality is 30 per 1,000 live births and life expectancy is 70 years. The Ministry of Environment and Natural Resources estimates that the Vietnamese spend 100 million dollars per year on medicine for illnesses caused by pollution. Some 50% of 8,000 factories reviewed did not meet minimum environmental standards.

URBAN WATER & SANITATION

The Ministry of Natural Resources and the Environment (MONRE) was established in 2002, replacing the former Ministry of Science Technology and Environment (MOSTE). Within MONRE the Department of Water Resources Management is now responsible for the state management of Water Resources.

Policies, laws, decrees and regulations regarding water and sanitation include:

- Law of Water Resource and Decree 179, 1999.
- Decree 200/TTg on guaranteeing clean water and rural environmental sanitation, 1994.
- Instruction 487/TTg on strengthening the State Management for water resources, 1996.
- Strategic Orientation of Urban Water Supply up to 2020, Ministry of Construction (MOC), Decision 63, 1998.

Three city government agencies are responsible for water and sanitation:

- The Department of Transport Communication and Public Works plans the water supply network and other infrastructures.
- The Water Supply Company operates the water supply.
- The Urban Water Drainage Company operates the waste and storm water networks.

This might change with privatization. In 1999 a Malaysian consortium was awarded a 20-year BOT contract by Ho Chi Minh City Water Supply Company and the People's Committee to build the first private sector water treatment plant. However, the agreement was terminated about one year later.

Most of the drinking water for Ho Chi Minh City is supplied from the Dong Nai River through the Hoa An pumping station. This is downstream from the massive Bien Hoa industrial park which discharges 200,000 m^3 of industrial wastewater per day. In the outlying areas of the city many households and private companies use wells. Some small private companies also supply underground water to residential areas.

Urban access to improved drinking water remained at 93% between 1990 and 2002. Urban household connections also remained at 51% during this period. Only 60% of the population has access to clean water. In Ho Chi Minh City many resident takes their water directly from the canals. In order to improve

the situation, the government issued a development plan for water supply with the objective of providing clean water for 80% of the population by the year 2010.

Currently, all the provinces and cities have water, sewage, and drainage projects with about 200 water treatment plants throughout the country producing 2.7 million cubic meters per day. The Vietnam Water Supply and Sewage Association (VWSA) estimates that the total investment for water supply projects will be more than US$ 2 billion for the next ten years.

At present, industrial wastewater, municipal wastewater, seepage from garbage dumps, and agricultural run-off all contribute to urban water pollution. Water sources are contaminated with PCBs, DDTs, heavy metals, and fecal bacteria. In some areas leakages of Agent Orange and other defoliants are a concern. Water pollution is serious in Hanoi, Ho Chi Minh City, Hai Phong, Da Nang, Hue, Nam Dinh, Hai Duong and other large cities and towns.

Urban households in Ho Chi Minh City pay monthly[79] $0.17/m^3 for the first 4m^3 of domestic water supply and $0.25/m^3 for additional water. In 2003 MONRE issued Decree 67/2003 adding a 10% surcharge for sewage.

Urban sanitation coverage rose from 46% in 1990 to 84% in 2002[80]. Combined drainage systems mix domestic and industrial wastewater with rainwater. At present no cities have centralized wastewater treatment plants. In April 2004 HO CHI MINH CITY municipal council approved the spending of 1$1.85 million for a wastewater treatment plant at Phuoc Hiep. HO CHI MINH CITY Chairman estimates that they will need to spend $128 million on environmental programs in 2005.

AIR QUALITY

In 1991 GOV approved the "National Plan on Environment and Sustainable Development, 1991-2000". The former MOSTE prepared the "National Strategy for Environmental Protection to 2010". Provinces and cities also formulated their local environment protection strategies to 2005 and 2010.

The laws related to air pollution include:

- The Law on Environmental Protection, 1993.
- Regulations on Traffic Safety and Order of Road and Urban Transport, Decree 36/CP, 1995.
- Ambient air quality standards TCVN 5937, 1995.

Instruction No24/2000/CT-TTg, issued on November 23, 2000, instructed unleaded gasoline to be phased out by July 1, 2001. This was hailed by the World Bank as a huge success story eliminating lead pollution "over night" and avoiding a lengthy and costly phase-out program[81]. One source of

[79] September 2004

[80] Includes connection to public sewer, connection to septic system, pour-flush latrines, and ventilated improved pit latrines: WHO and UNICEF, 2004

[81] An overnight success - Vietnam's switch to unleaded gasoline: World Bank ESMAP Paper

information suggests that this phase-out has take longer than planned and that, in 2004, Vietnam will still consume 700,000 tons of leaded gasoline and its ban is now scheduled for December 2005[82].

The Vietnam Environment Protection Agency (VEPA) under MONRE is the concerned agency. VEPA set up a national environmental monitoring network in 1994. The network had grown to 19 stations by 1999, monitoring basic parameters of air and water quality every three months at 63 locations. Under MONRE, VEPA is increasing the intensity of monitoring and the number of monitoring stations.

Urban air quality is affected by particulates, lead, NOx, SOx, and carbon monoxide. The main sources of urban air pollution are:

- Industrial.
- Vehicular.
- Construction activities.
- Cooking.

In Ho Chi Minh City urban haze is rare, although trans-boundary haze from Indonesia sometimes covers southern Vietnam. In Ho Chi Min City, Hanoi, Haiphong and Da Nang CO and NOx levels are with the prescribed limits.

CONCLUSIONS AND COMMENTS

On paper Vietnam has an adequate law and decree system at the central level, but implementation at the local level has been weak. There are several reasons for this including under-funding, under-staffing and the failure to mobilize public opinion in support of environmental regulation for clean air.

[1] A Strategic Framework for Air Quality Management in Asia. Produced in collaboration with the Air Pollution in the Mega-cities of Asia and the Clean Air Initiative for Asian Cities. ISBN 89-8464-095-6. Stockholm Environment Institute, Korea Environmental Institute, Ministry of Environment-Korea. 2004.

[82] People's Army, September 6, 2004

ANNEX 2. MULTILATERAL DONOR PROJECTS IN AIR QUALITY AND URBAN WATER AND SANITATION

Donor	Project	Description
Bangladesh		
WB[83]	Bangladesh Water Supply Program Project	The Bangladesh water Supply Program Project contributes to Bangladesh's efforts to achieve the Millennium Development Goals (MDGs) in water supply and sanitation by 2015. Specifically, the project will pilot innovative measures to scale up the provision of safe water supply free from arsenic and pathogens in rural areas and small towns.
	Air Quality Management Project	Project components include: The first component includes enforcement of emissions regulations for in-use vehicles, development of vehicular emissions and fuel standards, lubricant regulations, and pilots for vehicular pollution control. The second component, essential air quality information and evaluation of pilot activities will include air quality monitoring in Dhaka, air quality laboratory upgrade, and four studies examining key issues affecting public health.
ADB	Secondary Towns Water Supply and Sanitation	The Project is designed to provide sustainable and safe water supply and sanitation facilities in selected district towns to (i) improve health conditions and introduce public health and hygiene concepts, (ii) enhance the standard of living and quality of life of households, and (iii) accelerate industrial and commercial development.
Cambodia		
WB	Provincial and Peri-Urban Water and Sanitation Project	The Cambodia Provincial and Peri-Urban Water and Sanitation Project aims to assist the country in moving forward to fulfill the Millennium Development Goals (MDGs) in water supply and sanitation by 2015. The project design aims at building partnerships with the private sector and user groups in financing, operating, and maintaining constructed facilities, after designing specific instruments that ensure inclusion of low income communities residing in the service areas.
ADB	Provincial Towns Improvement Project	The Project aims to support the Government's development objectives that give priority to human development and poverty reduction. The Project will rehabilitate the water supply systems in six towns, develop a sewerage collection and treatment system in Sihanoukville, improve community sanitation conditions in three towns, and help mobilize resources at the local government level.
China		
WB	Hai Basin Integrated Water and Environment Management Project	The overall objective is to catalyze an integrated approach to water resource management and pollution control in the Hai Basin. The project has the following four components: Component 1) Will finance consultant services, training, goods and small works. The Integrated Water and Environment Management (IWEM) will be divided into 3 subcomponents: (a) Strategic Studies at the central and Hai Basin levels; (b) integrated water and environment management planning; and (c) demonstration projects.

[83] WB World Bank. ADB Asian Development Bank

Donor	Project	Description
	Second Tianjin Urban Development and Environment Project	The Second Tianjin Urban Development and Environment Project will develop and implement physical and institutional measures to enhance the efficiency, and equity of urban wastewater management, and transportation systems. The project consists of the following components: 1) the construction of storm water drains, sanitary sewers, and pumping stations, in Nanbeicang and Fukangnanlu areas,; drains and sewers in the south suburb district of Tianjin; construction of a WWTP in Shuanglin; construction of water reclamation plants at the Dongjiao and Shuanglin WWTPs, and reclaimed water distribution systems for industrial/landscape uses; dredging and rehabilitation of cross-sections, bridges and culverts, and pumping stations of the Dagu Canal; and, municipal wastewater collection, and treatment systems in suburban towns of Tianjin municipality.
	Guangdong Pearl River Delta Urban Environment Project	The Guangdong Pearl River Delta Urban Environment Project will assist in addressing the environmental problems of the Pearl River Delta in Guangdong Province and the South China Sea, through the improvement and rationalization of environmental service delivery based on a regional planning approach. The project's global environmental objective is to improve the environmental condition of the South China Sea's large marine ecosystem by addressing the major threat of land-based pollution. The project's five components support (1) Wastewater Management; (2) Hazardous Waste Management; (3) Inter-Municipal Environmental Infrastructure; 4) Water Quality Monitoring and Information Systems; and (5) Institutional Strengthening and Training.**
	Huai River Pollution Control Project	The Huai River Pollution Control Project aims at upgrading the water quality in the Huai River Basin, namely in the provinces of Anhui, and Shandong, through improved collection, and treatment of wastewater in the municipalities of these two provinces. The two main components will: 1) support wastewater investments in the Anhui Province in eight municipalities, through the implementation of the first phase of the Wastewater Master Plan. Investments include the construction of secondary sewers, and house connections; interceptors; pumping stations, and pumping/transmission mains. In addition, construction of wastewater treatment plants will also be financed in Guoyang, and Luan municipalities. The capacity of the Anhui Environmental Monitoring Center will be strengthened by upgrading its equipment, and municipal laboratories, providing vehicles for field sampling; and improving technical, and managerial skills.
	Hubei Urban Environment Project	Specific objectives of this project are to: 1) put in place institutions and policies able to sustain progress on the provincial plan for environmental improvement; 2) improve wastewater collection and treatment in three cities, thus maintaining and raising surface water quality to levels suitable for municipal supply, agricultural, or other purposes; 3) improve waste management in four cities, thus protecting water and land quality; and 4) identify the highest-impact industrial air and water polluters and significantly reduce their pollution. The project will support policy and institutional innovation, and provide physical works for wastewater handling, air pollution control, and solid waste management. Its components are the following: 1) wastewater management in Huangshi, Wuhan and Xiangfan, comprising sewer systems, pump stations, and wastewater treatment facilities; 2) municipal wastes management in Huangshi, Wuhan, Xiangfan and Yichang, comprising sanitary landfill development, waste transfer facilities, vehicles and equipment; 3) industrial pollution control; 4) Hubei environmental pollution control fund; 5) water quality monitoring and management in Hubei and Wuhan environmental monitoring centers, comprising water quality monitoring technology, data management equipment, and institutional development; and 6) institutional strengthening through technical assistance and training.
	Liao River Basin Project	The Liao River Basin Project will assist in the environmental recovery of, and enhance water quality management for an integrated river basin management approach, in the Liaoning Province. The components include: 1) construction of the wastewater interception, and treatment plant at Panjin, as well as interceptor sewers, and new pumping stations – including modifications to existing pumping stations. A sanitary landfill for sludge disposal will be in place; 2) wastewater treatment, recycling, and process modifications, for the recovery of processed raw materials, to obtain lignin products (lignosulfonate), a binding material used primarily for zinc manufacturing; 3) construction of the wastewater treatment plant at Xipaotai, to serve the southern/western catchments of Yingkou; 4) construction of a chlorine production facility, based on modern ion membrane cell technology; 5) works, and equipment for reinforced concrete pipe interceptors along the north bank of the Xiaoling River, a wastewater treatment plant, and a sanitary landfill for sludge disposal; 6) support for urban management information systems on infrastructure planning.
	Liaoning Environment Project	The Liaoning Environmental Project will support a sustainable environmental setting for the long-term economic and social development of the Province, through the provision of urban infrastructure, services, and management improvements. The project will assist in financing an investment program addressing: (a) deficiencies in wastewater treatment in Anshan, Benxi, Dalian, and Fushun; (b) improvements in solid waste collection and disposal and water conservation management in Dalian; (c) air pollution mitigation measures in enterprises, including improvements in district heating, in Benxi; (d) the shortages and poor quality of water supply in Jinzhou and the pollution load emanating from the Jincheng General Paper Mill in Jinzhou.

Donor	Project	Description
	Second Beijing Environment Project	The Second Beijing Environment Project aims at a visible and sustained alleviation of air and water pollution in Beijing. The project consists of the following components: 1) The first component will support the conversion of medium-sized heating boilers from coal to natural gas. 2) The Gas Boiler Market and Technology Development component will support activities to develop industry-wide technical capacity, remove market information gaps, facilitate and aggregate market demands, reduce excess costs incurred by early converters, and structurally reduce the costs of gas boiler equipment and services. 3) The Heating Energy Conservation component will support the establishment of the technical and institutional basis to encourage sustained market-based energy conservation in various elements of the heating systems. 4) The Air Quality Monitoring and Decision Support System Improvement component will upgrade and renovate the existing monitoring stations. 5) The Liangshui River System Sewers will be constructed. 6) The Liangshui River System Wastewater Treatment Plants will be constructed. 7) The Qing River System Sewers will be constructed.
	Shandong Environment Project	The project, part of a phased development program, comprises a blend of policy and investment initiatives, which support municipal strategies for environmental recovery and sustained use of natural water resources. The five core components are: 1) investments in the Jihan Municipality for surface-water storage, pumping, transmission, and distribution facilities to improve water supply system reliability and protect groundwater; and investments in wastewater collection and pumping stations to protect Xiaoqing River water quality and fully use existing treatment facilities; 2) investments in district heating systems in Weihai Municipality, comprising combined heat and power generation plant and facilities, distribution systems, and support services for improved air quality; 3) investments in district heating systems in Yantai Municipality, comprising peak boiler and heat exchange plant and facilities, distribution systems, and support services for improved air quality; 4) environmental pollution and control; and 5) investments to support and strengthen provincial, municipal, project, and financial management, as well as construction of supervision services, training in sector and utility operations, and updating of the Xiaoqing River Basin water quality and management database.
	Tai Basin Urban Environment Project	The project has the following components: 1) deals with the most-heavily polluted perimeter lake - Wuli Lake, and includes: (a) pollution control facilities (b) lake-bank restoration; and (c) pilot research in ecological restoration. 2) will control gates on Xujiang and Shangtang Rivers to enhance flood protection and prevent the intrusion of polluted water from the Grand Canal into Suzhou's urban canal system; and to prevent the loss of clean water diverted through Xitangh River from the WangYu River. 3) Will include: (a) technical assistance for capacity building for wastewater utilities management, and financing; (b) training in project management; (c) technical assistance for engineering design and construction supervision.
	Shanghai Urban Environment Project	Project components address: 1) Shanghai's wastewater management, by financing both collection, trunk sewers, pumping stations, wastewater treatment plants, as well as outfall and sludge treatment methods; 2) urban solid waste management, to establish environmentally cost-effective municipal solid waste management services in urban areas, by adopting user tariffs to ensure cost recovery of municipal services, as well as adopting a market-oriented institutional arrangement for the provision of municipal solid waste management services; 3) urban planning, and pilot upgrading, will assist in the planning for institutional, and administrative frameworks, focused on the planning, construction, and management goals for urban infrastructure improvements, implemented in a three-phase adaptable program lending; 4) the Upper Huangpu River catchment environmental management, to improve its environmental management, and protection of its water resources.
	Zhejiang Urban Environment Project	The project has the following seven components: Component 1) Construction of sewerage trunk infrastructure in South Jiangdong of Ningbo municipality, including a wastewater treatment plant. Component 2) Construction of sewerage trunk infrastructure in Zhenhai district of Ningbo municipality, including a wastewater treatment plant. Component 3) The proposed infrastructure improvements under Zhejiang Urban Environment Project (ZUEP), which are complementary to a larger redevelopment and conservation of this historic town, consist of rehabilitation and expansion of the traditional road infrastructure with associated underground infrastructure, sewage collection, pumping main and treatment facilities. Component 4) The project is assisting the rapid development in the area through clean-up of the lake through additional sewerage and treatment infrastructure to intercept the numerous discharges of wastewater to the lake. Component 5) Housing Renovation and Heritage Conservation in the five historic precincts of the Old Town. 6) Provision of a new landfill and associated facilities, adjacent to and partially overlying the existing Tianziling landfill site located near the village of Qinglongwu. Component 7) Technical Assistance with Institutional/Financial Utility Reform, Design Review and Construction Management, Industrial Pollution Control, Tourism Development and Heritage Conservation.

Donor	Project	Description
ADB	Fuzhou Environmental Improvement Project	The Project seeks to improve the urban environment of Fuzhou through the construction and rehabilitation of sewer networks, rehabilitation of inland river system, and the strengthening of urban governance in water resource management. Specifically, the Project will (i) construct about 210 km of sewers that will improve the urban environment for 1.85 million urban residents; and (ii) improve the water quality to achieve targeted standards in the inland rivers and Min River that would support the integrated approach in water resources management.
	Harbin Water Supply	The main objectives of the Project are to (i) provide 450,000 m3/day of clean water supply in Harbin; (ii) improve public health by providing clean safe water; (iii) promote long-term urban development in Harbin city by avoiding water shortages; (iv) provide institutional strengthening of Harbin Municipal Water Supply Construction Company (HMWSCC) and Harbin Municipal Tap Water Company (HMTWC); and (v) use tariff reform to achieve full cost recovery.
	Wuhan Wastewater Management	To achieve sustainable wastewater management and protection of water resources, the overall objective of the WWMP is to increase wastewater treatment capacity in Wuhan from the current 6% (19% after completion of an ongoing World Bank project) to approximately 45% of generated wastewater. Achievement of this objective will be key to achievement of the related objectives of the WWMP to (i) improve water quality of rivers and lakes in Wuhan; (ii) protect drinking water resources; (iii) strengthening the capacity and efficiency of the WMWC; (iv) improve health and living standards of residents in Wuhan; and (v) improve water quality in downstream reaches of the Changjiang
	Hebei Wastewater Management	The main objectives are to improve the urban environment by reducing environmental pollution through improved wastewater management, and to improve the water quality of surface-water and groundwater resources within and downstream from the project cities. Related objectives include (i) creating or strengthening the capacity of municipal sewerage companies to be efficient and managed on commercial principles; (ii) introducing comprehensive approaches to basin-wide pollution prevention and control; and (iii) improving cost recovery from users through an improved tariff structure, with gradual increases to achieve full cost recovery.
	Tianjin Wastewater Treatment and Water Resources Protection	The main objectives of the Project are to improve: (i) the urban environment by reducing environmental contamination through improved wastewater management; and (ii) the quality of raw water supply in Tianjin. Related objectives include strengthening the capacity of the raw water supply and wastewater operations to be more efficient and managed on commercial principles, introduction of comprehensive watershed management approaches, and improvement of revenue collection through an improved tariff structure, with gradual increases to achieve full cost recovery.
	Fuzhou Water Supply and Wastewater Treatment	The objectives of the Project are to improve the quality and quantity of water supplied to Fuzhou City, and improve the urban environment by reducing contamination of the local water courses in Fuzhou City and the Min River. The objectives of Part A will be achieved by constructing the 22-kilometer (km) Ao River transfer scheme with capacity of 800,000 cubic meters/day to bring water to Fuzhou City, 1,300,000 cubic meters/day water treatment plant, and 25 kilometers of related supply mains to the eastern area of the city. The objectives of Part B will be addressed by constructing a 200,000 cubic meter/day wastewater treatment plant at Yang Li, 40 km of trunk sewers and interceptors, and five pump stations; and rehabilitating 53 km of the existing sewer network
	Jilin Water Supply and Sewerage Development	The objective of the project is to (i) increase the wastewater treatment capacity and improve the urban ecological environment in Changchun which would contribute to the clean-up of the Songhua river basin; (ii) address problems linked to drinking water shortages and water quality issues in Shuangyang district, and Liaoyuan and Meihekou cities, and (iii) promote the sustainable economic development of the project cities.
	Henan Wastewater Management Project	The objectives of the Project are to improve the urban environment and public health through improved wastewater management, and to improve the quality of surface water and groundwater in and downstream of the project countries. Related objectives include: (i) creating municipal wastewater companies and making them efficient and commercially managed; (ii) supporting comprehensive approaches to river basin-wide pollution prevention and control; and (iii) improving cost recovery from users through improved tariffs with gradual increases to full cost recovery
	Shandong Hai River Basin Pollution Control Project	The Project will include (i) construction of wastewater treatment facilities to increase treatment capacity by 800,000 m3/day, (ii) installation of water recycling systems to increase production capacity by 60,000 m3/day, and (iii) development of appropriate solid waste management systems with treatment capacity of 1,300 tons/day. The Project will benefit both the poor and non-poor by improving the living environment in selected areas in the Shandong province.

Donor	Project	Description
	Zhejiang-Shanxi Water Supply Project (Phase II)	The main Project components consist of (i) connections from the existing water systems to the new raw water tunnels constructed under Phase I, including pipelines and raw water pumping stations; (ii) construction of three new water treatment plants; (iii) rehabilitation of four existing water treatment plants; (iv) treated water transmission mains and pump stations; (v) rehabilitation and expansion of the distribution systems including leakage repair and metering; (vi) construction of wastewater collection and disposal facilities; (vii) capacity building of Shanxi Water Supply Investment Company (SWSI) to implement, operate, manage the new systems with an emphasis on improved efficiency, commercial operations, cost recovery, and sustainability; and (viii) institutional strengthening of Wenzhou Municipal Government's (WMG) capacity to set effective policies to ensure sustainability of SWSI and the Project through rational operational budgets and cost-recovery mechanisms
India		
WB	Karnataka Urban Water Sector Improvement Project	The Karnataka Urban Water sector Improvement Project components will: a) assist the State Government in finalizing its policy reform agenda, and carry out initial implementation steps of staged sector reforms; and, to prepare business model, and private sector participation processes for service provision in Karnataka. The second component will improve the service provision, and attain continuous service in selected demonstration zones; generate credibility in the overall program and learn lessons on the challenges faced in the demonstration zones for scaling up continuous service provision; and, simultaneously improve the efficiency of bulk supply operations, and distribution networks, attaining initial improvements in water service provision to all State residents. The third component will finance the project's incremental operational costs, and studies related to project management and implementation, including incremental, short term consultants for the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)
ADB	JFPR-Rainwater Harvesting and Slum Development In Rajasthan	The project aims at reducing water-related human poverty in slum areas in Rajasthan through rainwater harvesting, micro-drainage, sanitation, garbage collection and awareness generation.
	Urban Water Supply and Environmental Improvement in Madhya Pradesh	The primary objective of the Project is to promote sustainable growth and poverty reduction in the six Project cities in Madhya Pradesh, and thereafter in the other cities in the state. The Project comprises three parts. Part A for the urban water supply and environmental improvement covers the improvement and expansion of the following municipal infrastructure and services: (i) urban water supply, (ii) sewerage and sanitation, (iii) storm water drainage, and (iv) solid waste management.
	Calcutta Environmental Improvement	The Project will improve the welfare and well being of the people of Calcutta, especially the poor, through an improved urban environment, equitable access to municipal services, and more effective municipal management. It is a high priority investment for the Government of West Bengal, and is designed to support the Government's move to devolve responsibility for urban management from the states to the municipal administrations. Under the Project, a policy and institutional framework will be established to sustain the investments in sewerage and drainage, solid waste management, slum improvements, and canal rehabilitation.
	Karnataka Urban Development and Coastal Environmental Management Project	This integrated urban development project will help meet basic human needs by developing urban services for water supply and sanitation, solid waste and wastewater management, and slum and environmental improvements. The Project will also support street improvements and traffic management, and strengthen other municipal services required to improve the quality of life in urban areas. The Project will provide assistance in capacity building and community participation at the state and local levels and in Project implementation.
Indonesia		

Donor	Project	Description
ADB	Water Supply and Sanitation Sector Program Loan	The project will help operationalize the Government's policy and regulations governing local water enterprises (PDAMs) and (i) identify the improvements required in the management capacity of local governments and PDAMs to help them provide more efficient service and higher service levels, and to become financially self-sustaining; (ii) evaluate the levels, and causes of, unaccounted for water and recommend steps required to reduce both physical and administrative losses; (iii) determine the need for rehabilitation and maintenance of existing water supply and sanitation facilities; (iv) review the legislation and regulations governing PDAMs and recommend ways to streamline or strengthen them; (v) identify mechanisms to improve the water supply to meet national standards for human consumption; (vi) determine measures to increase the level of collection of solid wastes with proper disposal to controlled landfills; (vii) provide institutional strengthening to facilitate increased public participation, transparency, governance, local financing capability, private sector involvement, and long-term sustainability.
Lao PDR		
ADB	Water Supply and Sanitation Sector Program Loan	The Project is designed to support the decentralization of the water supply sector through the establishment of a regulatory framework and capacity building of locally managed water supplies. In addition, the Project will enable the Government to implement the provisions of its newly issued water supply and sanitation sector policy and investment plan through investments in water supply and sanitation systems in small towns and the periurban areas of Vientiane. It will improve environment health and enhance human development in the target communities.
Nepal		
ADB	Melamchi Water Supply Project	The Project will improve the health and well-being of the people in Kathmandu Valley by alleviating the critical water stress in the region, where one million urban dwellers receive piped water for only two hours every two days. This will be accomplished by tapping additional water resources from the Melamchi River, increasing the water treatment capacity, enhancing access to water, and optimizing the use of existing water resources. The Project will introduce institutional reforms with a view to ensuring sustainability of services.
	Small Towns Water Supply and Sanitation Sector	The Project will assist the Government in implementing a part of its 15-year plan for small towns' water supply and sanitation development. The Project will provide water supply, limited drainage, and sanitation facilities in selected small towns following a demand-driven, interactive procedure that ensures full participation of the local water users and non-government organizations in the formulation, implementation, and operation and maintenance of the subprojects.
The Philippines		
WB	LGU Urban Water and Sanitation Project APL2	The project objective of the Second LGU Urban Water and Sanitation Project (APL) for the Philippines is to extend the outreach of the project to approximately 40 more LGU-managed water utilities. The project objective is one of confirming in more LGUs that the project design concept in APL1 is robust enough to be mainstreamed into the water supply sector of the Philippines. There are four project components. The first finances civil works, equipment, and supervision for improved water supply systems in LGUs, water utilities where private operators were selected under procedures acceptable to the Bank, and regional water utilities. The second component finances physical infrastructure in household toilets, on-site sanitation facilities, including soakaway pits for septic tank effluents or the disposal of wastewater flows arising from augmented water supplies hygiene education. The third component finances investments and consultant services in micro-drainage infrastructure.
ADB	Laguna de Bay Institutional Strengthening and Community Participation/LISC OP	The Project will assist the Laguna Lake Development Authority (LLDA), Local Government Units (LGUs), and other stakeholders, improve the environmental quality of the Laguna De Bay watershed. The project will have two main components: 1) Support demand-driven investments (sub-projects), designed to improve the watershed environmental quality. Subproject selection, and prioritization will be based on the results of a participatory micro-watershed-based planning, and subproject identification process, within four categories: (a) waste management and sanitation; (b) natural resources management; (c) soil erosion and localized flood prevention; and (d) eco-tourism. The identified interventions will constitute an integrated program of sub-projects that will be implemented concurrently within a micro-watershed by multiple LGUs, with each LGU borrowing for a sub-project within its jurisdiction.
	MWSS New Water Source Development Project	The main objective of the Project is to provide Metropolitan Waterworks and Sewerage system (MWSS) with a technical assistance loan to engage consultants to prepare projects for new water source development. The resulting projects would be suitable for consideration for financing by ADB, the private sector, or other sources. They will improve the living conditions and health of the population in Metro Manila through providing safe water supply and will facilitate the expansion of the service area, particularly benefiting the urban poor. The Project scope consists of consulting services for Part A - Development of New Water Source Projects and for Part B - Capacity Building.

Donor	Project	Description
Sri Lanka		
ADB	Greater Colombo Wastewater Management Project	The project will cover rehabilitation to the existing systems, repairs to the sewer outfalls, upsizing of under capacity sewers, and upsizing of under capacity pumping stations. The project will have special focus on the methodology to include the low-income groups and poor communities in the urban and rural areas. In addition, institutional and capacity building components will be formulated for the purpose of improving asset management and operation and maintenance of the sewerage system. For onsite sanitation, the proposed investment project will assist with the development of appropriate treatment and disposal facilities.
Thailand		
WB	Clean Fuels and Environmental Improvement Project	The project comprises the following components: 1) a deep gas oil hydrotreater (DGOHT) of 30,000 barrels stream per day (bpsd) capacity to enable the production of 0.05 weight percent sulfur diesel oil; 2) a fluid catalytic cracker (FCC) of 16,000 bpsd capacity and modifications to existing naphtha reformer to produce high octane, low aromatic and low benzene content gasoline, in order to enable the refinery's gasoline pool to meet unleaded octane requirements, and permissible aromatics and benzene and other prescribed specifications; 3) the installation of equipment and facilities to further enhance the refinery's environmental mitigation system and safety; 4) the purchase of modern air quality monitoring equipment; 5) project engineering and management; 6) acquisition of technology and procurement of catalysts and chemicals; and 7) training.
ADB	Samut Prakarn Wastewater Management	The project comprises (i) wastewater collection systems including over 300 kilometers of interception and collection sewers, and associated pumping stations; (ii) central wastewater treatment including a 525,000 cubic meters/day extended aeration plant and associated disposal facilities; (iii) wastewater and effluent monitoring systems; (iv) industrial pollution prevention and a clean technology transfer program; and (v) strengthening the capacity of Government agencies responsible for planning and implementing wastewater management projects.
Vietnam		
WB	Ho Chi Minh City Environmental Sanitation (Nhieu Loc-Thi Nghe Basin) Project	The two components are: 1) Construction of the Nghie Loc Thi Nghe wastewater interceptor, to divert dry weather wastewater flows to the screening/pumping facility. In addition, combined sewer overflow structures will divert wastewater flows into the interceptor during dry weather. However, to mitigate the accumulated, odorous waters from the canal during rising tides, a canal flushing mechanism will be installed, drawing canal waters to the sewage interceptor, through withdrawal chambers located in the canal embankment, operated through automatic modes controlled from the pumping station. This pumping station will have hydraulic capacities, and is located at the confluence of the canal, and the Saigon River, with a river outfall discharge. 2) Drainage works to replace, and extend combined sewers to reduce overflows of storm-water, and wastewater. Includes dredging works for sludge transportation and disposal; cleaning inspection of secondary sewers; and, construction of tertiary sewers.
ADB	Central Region Urban Environmental Improvement	The Project will strengthen local management capacities and the institutional framework for providing sustainable urban environmental services and improving urban infrastructure. It will improve drainage, sanitation, and solid waste systems in five provincial towns and one district level town in the central region of Viet Nam, where inadequate infrastructure poses serious environmental and health risks, and inhibits social and economic development. The Project will also increase environmental and health awareness and promote the active participation of citizens, particularly women and the poor, in urban management and services.
	Third Provincial Towns Water Supply and Sanitation	The Project aims to improve water supply and environmental sanitation conditions in the Project towns through integrating critically-needed infrastructure developments with community awareness and participation, improved financial management and cost recovery by WSCs, and local regulations on sanitation, wastewater management, and water source protection. The scope of the Project includes the design, development and delivery of (i) community environmental sanitation improvement program in each Project town; (ii) water supply systems to provide better quality water and greater examination was carried out for each project town, and a supplementary analysis was coverage in the towns and adjoining districts; (iii) drainage and sanitation improvements; and (iv) project implementation assistance and capacity building.

ANNEX 3: LIST OF CONSULTATIONS – UNITED STATES AND ASIA

Bangladesh – July 21-22, 2004

Dhaka

- Bruce McMullen, Sr. Energy Advisor, USAID
- Mamumul Khan, Natural Resource Management Specialist, USAID
- Afroza Ahmed, Project Officer, Water and Environmental Sanitation Section, UNICEF
- Mohamed Monirul Alam, Water and Environmental Sanitation Section, UNICEF
- Mohamed Mujibur Rahman, Professor of Civil & Environ. Engineering, Bangladesh University for Engineering and Technology
- Iftekhar Enayetullah, Director, Civil Engineering-Urban Planning, Waste Concern
- M. Reazuddin, Technical Director, Ministry of Environment and Forests, Department of Environment

India – July 19-23, 2004

Chennai, July 19, 2004

- R. Desikan, CONCERT, and colleagues
- Leena Thomas, Alliance To Save Energy
- Karuthiya Pandian, I.A.S., Managing Director, Tamil Nadu Water and Drainage Board
- Joseph Ravikumar, Program Management Specialist, USAEP
- P. Vaidyanathan, Commercial Specialist, Foreign Commercial Service
- M. Ravikumar, Vice President, Tamil Nadu Urban Infrastructure Financial Services Ltd.
- Chad Peterson, Environment Specialist and Erike Martine, Environment Specialist, US Consulate

Mumbai, July 19, 2004

- Suneel Parasnis, Regional Director, USAEP/USAID, Western Region
- Nutan Zarapkar, Deputy Director, USAEP/USAID, Western Region
- M.Janardhan, Program Advisor, Public Affairs Section
- Angus Simmons, Consul General
- Rebecca Frerichs, Economics Officer and Vice Consul
- Suneel Parasnis, Director Western Region
- Round Table Meeting at US Environmental Resource Center (US ERC):
  - Kamal Vora, Deputy Secretary General Indo-American Chamber of Commerce
  - Veena Dharmaraj, Assistant Manager, United States Environmental Resource Center; Mangesh Dighe, Traffic Planning Department, Pune Municipal Corporation
  - Ajit Kamar Jain, Senior advisor, Solid Waste Management Cell, Government of Maharashtra; Rakesh Kumar, Head, National Environmental Engineering Research Institute

- Nikesh P. Shah, EWM Services, Goodwill Builders
- Bharat Nimbarte, Regional Officer, Maharashtra Pollution Control Board

New Delhi, July 20-22, 2004

- *July 20*
  - USAID Mission Meeting with Rebecca Black, John Smith Sreen, Jerry Tarter, N. Bhattacharjee, Renu Sehgal, David Foster, Madhumita Gupta, Sandeep Tandon, S. Padmanabhan, Archana Walia, Anand Rudra, Ram Berry, Don Brown
  - Walter North, Mission Director, USAID/India
  - Kris Easter and K. Balakrishnan, USAEP/India Country Manager and Program Specialist
  - David Foster Urban Advisor, and N. Bhattacharjee, Program Manager (EC)/USAID
  - S. Padmanabhan, Energy and Environment Adviser (EEE) and Archana Walia, Program Manager, EEE
  - Amitabha Ray, PADCO
  - Ram Berry, Program Manager, EEE
  - Subrata Majumdar, Louis Berger
- *July 21*
  - Pushkin Chandra and David Heeson, Program Support Office USAID
  - Robert Beckman, Manager, SARI Energy project/USAID
  - Seema Arora, Senior Counsellor, Environmental Division, Confederation of Indian Industry
  - Sunita Naruain, Director, Anumita Roychowdhury, Air Specialist, and Sumita Dasgupta, Natural Resources Management specialist, Center for Science and Environment
  - Salman Zaheer, Water and Sanitation Project for South Asia (World Bank)
  - V. Rajagopalan, Chairman, Central Pollution Control Board of India
- *July 22*
  - Satish Sinha, Chief Program Coordinator, Toxics Link
  - Ashish Kundra, Additional CEO, and PK Tripathi, CEO, Delhi Jal Board
  - KK Gandhi, Director, Society of Indian Automobile Manufacturers

Calcutta, July 23, 2004

- George N. Sibley, US Consul General, Calcutta
- Arup Mitra, USAEP Project Management Specialist
- Mrinal Banerjee, Minster in Charge Department of Power and Non-Conventional Energy Sources, Government of West Bengal; also present were Sibley and Mitra, and S.P. Gon Chaudhury, Director West Bengal Renewable Energy Development Agency
- Bhaskar Rajah, Second Secretary, Public Affairs Officer, US Dept of State
- Asok Bhattacharya, Minister in Charge, Department of Urban Development, Government of West Bengal and Mr. Arnab Roy, Secretary, Kolkata Metropolitan Development Authority (KMDA), with members of Kolkata Metropolitan Development Authority (KMDA)
- T.S. Bandyopadhyay, Director, Institute of Wetland Management and Ecological Design (IWMED) under the Dept. of Environment
- K.J. Nath, Chairman and PK De, Chief Engineer, Officials of Arsenic Task Force, Government of West Bengal
- Nazeeb Arif, Secretary-General, Indian Chamber of Commerce

Indonesia – August 5-9, 2004

Jakarta

- *August 5*
  - Suzanne Billharz, US-AEP Country Program Manager
  - Edi Setianto, Energy Program, USAID/Jakarta
  - Anne Patterson, Water and Environment Office Director, Ms. Amrita, Water and Sanitation Office, USAID/Jakarta, and Anthony Woods, Dept. of State, Environment, Science, Technology & Health, US Embassy
  - Theresa Tuaño, Education Officer, USAID/Jakarta
  - Richard Hough, Director of Programming, USAID/Jakarta
  - Zakki Husein, Legal Program Director, Agus Loekman, Program Officer, The Asia Foundation
  - Arie Istandar & Ms. Restiti Sekartini, and Paul Butarbutar, Swisscontact
  - Moechti Soejachmoen, Ananta Gondomondo, Shanty Syahril and Bambang Susantono, Pelangi & SUSTRAN
- *August 6*
  - James Woodcock, World Bank, Water and Sanitation Program
  - Basah Hernowo, Bappenas, Direktorat Pemukiman dan Perumahan; Godman Ambarita, Executive Director, Bustran Foort, Advisor, PERPAMSI
  - Ridwan Tamin, Head, Mobile Sources Division, Ministry of Environment; Pranciscus Soeseno, Chair (Partnership for Clean Emissions) (MEB) and Ahmad Safrudin, Coordinator, Committee for Leaded Gasoline Phase-out (KPBB)
- *August 9*
  - Raman Letchumanan, Head of Environment Unit, ASEAN Secretariat
  - ala Kumar Palaniappan, Senior External Relations Officer, ASEAN Secretariat
  - Muce Mochtar, Technical Assistant, ASEAN Secretariat
  - Wendy Yap Hwee Min, Environment Unit, ASEAN Secretariat
  - Adelina Kamal, Senior Officer, Haze, ASEAN Secretariat
  - Andrea Richhart, ACP Coordinator, US Embassy
  - Basah Hernowo, Director of Human Settlement and Housing, National Planning Agency (BAPPENAS); Foort Bustraan, Institutional and Technical Advisor, Indonesia Water Supply Association (PERPAMSI)
  - William Frei, USAID Mission Director, Jon Lindborg, Deputy Director, Richard Hough, Program Office, Anne Patterson, BHS, Water and Sanitation

Laos – July 30, 2004

Vientiane

- Winston Bowman, Glen Anderson, Frank Peacock, and Jeffrey Jacobs attended all meetings
- Mekong River Commission
- Hans Guttman, Program Coordinator Environment Division
- Chanthavong Saignasith, Director, Natural Resources Development Planning Division
- Khuon Komar, Head of Water Utilization Programme Working Group 3 (Rules)
- Chumnarn Pongsri, Director, Environment Division
- Scott Laird Rolston, Economics Officer at the US Embassy
- Meeting at the Asian Development Bank Resident Mission

- Edvard M. Baardsen, Deputy Head of Mission
- Keu Moua, Project Implementation Officer, Environment and Natural Resources

The Philippines – August 2-5, 2004

Manila

- *August 2, 2004*
  - Briefing on US-AEP/Philippines Program: Contractors and Grantees (PADCO, LBG, IIE, ASE)
  - Joy A. Jochico, Development Assistance Specialist, USAID
  - Jose "Boy" Dulce, Project Development Specialist, Office of Energy and Environment, USAID
  - Milag San Jose-Ballesteros, US-AEP Program Officer
  - Jose Gerardo A. Alampay, US-AEP Philippine Program Coordinator
  - Lisa Kircher Lumbao, Environmental Management Specialist, Sustainable Economic Development, PADCO
  - Mr. Gil R. Dy-Liacco, Mission Economist, Deputy Chief, Program Office
  - Fatima S. Verzosa, Project Development Specialist, Program Resources Management Office
  - Laurie de Freese, Acting Chief, Office of Energy and Environment
  - Michael J. Yates, Ph.D, USAID/Philippines Mission Director
  - Elisea "Bebet" Guzon, Secretary, Department of Environment and Natural Resources (DENR)
- *August 3, 2004*
  - Meetings at the Asian Development Bank (ADB)
  - C.R. Rajendran (Director, Agriculture, Environment, and Natural Resources Division, Mekong Department)
  - Ian Fox (Principal Project Specialist, Natural Resources)
  - Javid H. Mir, Senior Natural Resources Specialist (Forestry), Agriculture, Environment, and Natural Resources Division, Mekong Department
  - Herat Gunatilake
  - Fred Roche, Director, Agriculture, Environment, and Natural Resources Division, South Asia Department, ADB
  - Bindu N. Lohani, Secretary of the ADB
  - Muhammed Mannan, Director, Agriculture, Environment, and Natural Resources Division, and Tetsuro Miyazato, Senior Water Resources Specialist, ADB
  - Bert van Ommen, Water Team Leader, and Francisco Roble, Jr., Water Knowledge Management Adviser, ADB
- *August 4, 2004*
  - Mutli-sectoral Roundtable Discussion on Air Quality Management Issues—Manila Observatory, Ateneo De Manila University, Diliman, Quezon City
  - Participants:
    - Jean Rosete, Environmental Management Bureau/Department of Environment and Natural Resources (EMB/DENR)
    - Willie Nava, USAID-funded Reduction of Vehicle Emission Preventive Maintenance Program
    - Desiree Narvaez, Department of Health
    - Fr. Dan McNamara, Director, Manila Observatory
    - Jess Motomool, Department of Trade and Industry

        - Bert Suansing, Transport Organization for Clean Air
    - Florencia Creus, Chief, Operations Division, Land Transportation Office
    - Roberta Domingo, Land Transportation Office
    - Teresita Borra, Director, Energy Utilization Management Bureau/ Department of Energy (DOE)
    - Vilma F. Co, DOE, Supervising Science Research Specialist
    - Jaime Fresnedi, Local Initiatives for Affordable Wastewater Treatment Project (LINAW), Mayor, Muntinlupa City
    - Representative Augusto Baculio, Republic of the Philippines House of Representatives, Chairman, Committee on Ecology
    - Bopeep Paloma, staff for Representative Baculio for environmental issues and legislation
- *August 5, 2004*
    - Terry Thompson, Regional Advisor of Environmental Health, World Health Organization (WHO)
    - Hisashi Ogawa, WHO, Regional Adviser, Healthy Settings and Environment
    - Joseph B. Tuyor, World Bank, Operations Officer, Environment
    - Maya Gabriela Q. Villaluz, World Bank, Operations Officer, Environment
    - Ato Cruz, Chief, Environmental Quality Division, Environmental Management Bureau (DENR)
    - Robert Blume, Director, American Desk at the Board of Investments
    - Mary Jane C. Ortega, Mayor, City of San Fernando
- *August 10, 2004 – conference call*
    - Charles T. Andrews, Principal Water Supply and Sanitation Specialist, ADB
    - Winston Bowman, US-AEP

Sri Lanka – July 22-23, 2004

Colombo

- *July 22, 2004*
    - D.S. Jayaweera, Secretary, Ministry of Transport
    - Manel Jayamanne, Director General, Central Environmental Authority
    - Nihal Abeysekera, President, Federation of Chamber of Commerce and Industries of Sri Lanka
- *July 23, 2004*
    - Carol R. Becker, Mission Director, USAID Sri Lanka
    - Jeffrey Allen, Director Economic Growth, USAID Sri Lanka
    - Dean Thomson, Head, Economic/Commercial, US Embassy Colombo
    - Teresa Manlowe, Economic and Commercial Officer
    - Ananda Mallawatantri, Coordinator, US-AEP Sri Lanka
    - Upali Daranagama, Project Specialist/ Energy, USAID Sri Lanka
    - Dinesha De Silva, Assistant Representative, The Asia Foundation
    - Meeting with Partners arranged by the Asia Foundation

Thailand – July 24-29, 2004

Bangkok

- *July 24, 2004*
    - PADCO Team:

- Paul Violette, Senior Policy Advisor
- Jane Nishida, Senior Policy Advisor
- Watcharee Limanon, Environmental Specialist

♦ *July 25, 2004*
- Paul Wedel, Executive Director, Kenan Institute Asia

♦ *July 26, 2004*
- Elaine Blatt, TSSC Chief of Party
- James Klein, Representative, The Asia Foundation
- P. Illangovan, Senior Environmental Specialist, World Bank
- Sirinun Maitrawattana, Research Assistant, World Bank
- Somrudee Nicro, Thailand Environment Institute (TEI)
- Monthip S. Tabucanon, Pollution Control Division, Ministry of Environment and Natural Resources (MONRE)

♦ *July 27, 2004*
- Ministry of Natural Resources and Environment, MoNRE
- K. Minquan Wichayarangsaridh, Pollution Control Department, MoNRE
- K. Panya Warapetcharayut, Pollution Control Department, MoNRE
- Wijarn Simachaya, Water Quality Management Bureau (WQMB), Pollution Control Division
- Suwan Nanthasarut, Environmental Office Region 5, Water Management Director
- Patcharawadee Suwanathada, PCD and Clean Air Training Network (CATNET)

♦ *July 28, 2004*
- Tim Higham, UNEP Regional Information Officer
- Pathcaree Siroros, Lecturer, Faculty of Political Science, Thammasat University
- Khun Wasant Techawongtham, Deputy News Editor, Environment and Urban Affairs, Bangkok Post
- Charas Suwanmala, Faculty of Political Science, Chulalongkorn University
- K. Suwat Singhapun, New Director General, Department of Environmental Quality Promotion

♦ *July 29, 2004*
- Supat Wangwongwatana, Deputy Director General, Pollution Control Department, MoNRE
- Pongdej Wanichkittikul, Office of the President of the Supreme Court of Thailand
- Witoon Poemposacharoen, Director General, TERRA (Towards Ecological Recovery and Regional Alliance)
- Suebsthira Jotikasthira The Federation of Thai Industries (FTI)
- Jefferson Fox, Senior Fellow, East-West Center
- Anthony M. Zola, Advisor, Mae Fah Luang Foundation
- Charles B. Mehl, Assistant for International Matters, Mae Fah Luang Foundation
- Judy Reinke, Commercial Attaché, US Department of State
- Yuwaree In-na, UNEP Program at Asian Institute of Technology

♦ *July 30, 2004*
- Weranit Thansuporn, Environmental Officer, Office of Natural Resources and Environmental Policy & Planning (ONREPP)
- Natarika Vayuparb-Cooper, Environmental Official (ONREPP)
- Mathya Raksasataya, Environmental Officer, Urban Planning (ONREPP)

Vietnam – July 25-27, 2004

♦ *Sunday, July 25*

- Meeting with Nathan Sage, USAEP Country Manager, Vietnam

- *Monday, July 26*
  - Mr. Philip Brylski Environmental Country Sector Coordinator, the World Bank
  - William Costin, Head, Infrastructure, Urban Development and Social Sectors
  - Pieter Smidt, Principal Project Implementation Officer
  - Jan Moller Hansen, Counsellor Development Cooperation, Danish Embassy/DANIDA
  - Dennis Zvinakis, past USAID/Vietnam Country Manager
  - Nathan Sage and Phung Van, US-AEP
- *Tuesday, July 27*
  - Hong Minh Dao, Deputy Director, Environment Department, MoNRE
  - Rick McGowan, Project Management Specialist, Rural Water and Sanitation Infrastructure and Health Improvement Project Preparation
  - Trinh Ngoc Giao, Director General, Vietnam Register (vehicle registration authority)
  - Nguyen Hoai Anh, Lawyer, International Cooperation Dept. Vietnam Register
  - Nguyen Phan Trung, International Cooperation Dept., Vietnam Register
  - Nguyen Thai Lai, Director, Resources Dept. Water Resources Management
  - Des Cleary, HydroSult, Inc. ADB Team Leader, National Coordination for Water Resource Management
  - Warren Martin, ADB Consultant
  - Nguyen Thi Ky Nam, Senior Program Officer Mekong River Committee
  - Nichole Motteux, Vietnam Program Coordinator, TSSD-Louis Berger
  - Phan Quynh Nhu, Clean Cities Coordinator, TSSD-Louis Berger

United States

- *June 30, 2004*
  - Winston Bowman, Regional Coordinator, US-AEP, Monica McQueary, USAID/W, US-AEP Liaison, John Wilson, USAID/W, ANE Environment
  - Asif Shaikh, President and CEO, IRG; Doug Clark, Corporate Vice President, IRG
- *July 1, 2004*
  - Dennis Cunningham and Ted MacDonald, Office of International Affairs, USEPA
- *July 7, 2004*
  - Anthony "Bud" Rock, Principle Deputy Assistant Secretary, Oceans and International Environmental and Scientific Affairs (OES), US State Department, Ann Stewart (OES), Diane Tate (OES)
  - Winston Bowman, Regional Coordinator, US-AEP, Monica McQueary, USAID
  - Vijitha Eyango, Senior Education/Gender Advisor, USAID
  - Winston Bowman, Regional Coordinator, US-AEP, Monica McQueary, USAID
  - Paul Procee, Air Quality Programs Coordinator, World Bank
- *July 8, 2004*
  - Gordon West, Acting Assistant Administrator, USAID/ANE
  - Winston Bowman, Regional Coordinator, US-AEP; Monica McQueary, USAID
  - US-AEP Strategic Advisory Committee
- *July 9, 2004*
  - US-AEP Partners Meeting (list of participants attached)
  - Kim Mihalik, Louis Berger, US-AEP TSSC

- Leslie Cordes, VP Program Development, Alliance to Save Energy (ASE)
- Christopher Godlove, Program Manager International (ASE)
- Lisa Surprenant, Standards & Labeling Program Manager (ASE)

♦ *July 13, 2004*
- John H. (Jack) Andre, II, ASEAN Cooperation Plan Coordinator, US Department of State
- Chris Whatley, Council of State Governments

♦ *July 14, 2004*
- Greg J. Bowder, Water Resource Engineer, East Asia & Pacific Region, World Bank
- Luiz Claudio Tavares, Senior Water and Sanitation Engineer Specialist, East Asia & Pacific Region, World Bank

♦ *July 27, 2004*
- Ernest Bower, President, US-ASEAN Business Council

♦ *August 20, 2004*
- Susan Wickwire, Chief, International Capacity Building Branch, Climate Change Division, USEPA, Kevin Rosseel, International Capacity Building Branch, Climate Change Division, USEPA, Katherine Sibold, Manager, Integrated Environmental Strategies Program, Global Programs Division, USEPA

♦ *Kickoff Meeting with USAID, June 30, 2004*
- Winston Bowman, Regional Coordinator, US-AEP, Monica McQueary, USAID/W, US-AEP Liaison, John Wilson, USAID/W, ANE Environment
- Asif Shaikh, President and CEO, IRG
- Doug Clark, Corporate Vice President, IRG
- Glen Anderson, Tony Pryor, Frank Peacock, Robert Kenson, Jeff Jacobs, and Whitney Sims, IRG

♦ *Meeting with USEPA, July 1, 2004*
- Ted McDonald, USEPA, Office of International Affairs
- Dennis Cunningham, USEPA, Office of International Affairs
- Winston Bowman, Regional Coordinator, US-AEP
- Monica McQueary, USAID/W, US-AEP Liaison
- Glen Anderson, Frank Peacock, and Robert Kenson, IRG

♦ *Meeting with the Office of Oceans and International Environmental and Scientific Affairs (OES), US State Department, July 7, 2004*
- Anthony "Bud" Rock, Principle Deputy Assistant Secretary, Oceans and International Environmental and Scientific Affairs (OES), US State Department, Ann Stewart (OES), Diane Tate (OES)
- Winston Bowman, Regional Coordinator, US-AEP, Monica McQueary, USAID
- Doug Clark, Tony Pryor, and Glen Anderson, IRG

♦ *Meeting with USAID Gender Advisor, July 7, 2004*
- Vijitha Eyango, USAID; Winston Bowman, Regional Coordinator, US-AEP; Monica McQueary, USAID
- Glen Anderson, Tony Pryor, Leticia Orti, Robert Kenson, and Frank Peacock, IRG

♦ *Meeting at the World Bank, July 7, 2004 (Note: Jitu Shah, World Bank SE Asia Coordinator was in Bangkok at the time of this consultation)*
- Paul Procee, Air Quality Programs Coordinator, World Bank
- John Core, IRG

- *Meeting with USAID, July 8, 2004*
  - Gordon West, Acting Assistant Administrator, USAID/ANE
  - Winston Bowman, Regional Coordinator, US-AEP, Monica McQueary, USAID
  - Doug Clark, Tony Pryor, and Glen Anderson, IRG
- *Meeting of the US-AEP Strategic Advisory Committee*
  - Owen Cylke, World Wildlife Federation
  - Alan Hurdus, USAID
  - Ted McDonald, USEPA
  - Ruth Greenspan Bell, Resources for the Future
  - Diane Tate, State Department
  - Del McCluskey, Development Alternatives, Inc.
  - Ann Stewart, State Department
  - Dennis Cunningham, USEPA
  - Karin Krchnak, World Resources Institute
  - Lindsey Fransen, World Resources Institute
  - Monica McQueary, USAID
  - Winston Bowman, US-AEP
  - Doug Clark, Tony Pryor, Glen Anderson, Leticia Orti, Frank Peacock, Robert Kenson, John Core, and Jeff Jacobs, IRG
  - Patricia Garcia, Training Resources Group, Inc.

Table A3-1: Meeting with US-AEP Partners

Name	Affiliation	Name	Affiliation
Tony Pryor	IRG	Lori Hatton	Louis Berger/TSSC
Von Millard	Louis Berger/TSSC	Chris Godlove	Alliance to Save Energy
Shehnez Atcha	Louis Berger/Energy Wise India	Ian Fitzsimmons	Institute of International Education
Diana Simon	Institute of International Education	John Speicher	Institute of International Education
Alex Patico	Institute of International Education	Jack Andre	TSSC/State Department
Chris Whatley	Council of State Governments	Jane Nishida	PADCO
Jill Lucas	Louis Berger/TSSC	Suzanne Young	Louis Berger/GET
Kim Mihalik	Louis Berger/TSSC	Martin Steinson	Louis Berger/TSSC
Shubhe Banskota	Louis Berger/TSSC	Robert Kenson	IRG
Whitney SIms	IRG	Frank Peacock	IRG
Glen Anderson	IRG	John Core	IRG
Jami Sachs	ICMA	Leslie Black Cordes	Alliance to Save Energy
Doug Clark	IRG	Leticia Orti	IRG
Winston Bowman	US-AEP Regional Coordinator	Julie Haines	Louis Berger

- *Meeting with Louis Berger, July 9, 2004*
  - Kim Mihalik, TSSC, Louis Berger
  - Robert Kenson, IRG
- *Meeting with the Alliance to Save Energy (ASE), July 9, 2004*

- Leslie Cordes, VP Program Development
- Christopher Godlove, Program Manager International
- Lisa Surprenant, Standards & Labeling Program Manager
- John Core, Frank Peacock, and Robert Kenson, IRG

♦ *Meeting with US Department of State, July 13, 2004*
- John H. (Jack) Andre, II, ASEAN Cooperation Plan Coordinator, US Department of State
- Doug Clark and Glen Anderson, IRG

♦ *Meeting with the Council of State Governments (CSG), July 13, 2004*
- Chris Whatley, CSG
- Doug Clark and Glen Anderson

♦ *Meeting at the World Bank, July 14, 2004*
- Greg J. Bowder, Water Resource Engineer, East Asia & Pacific Region, World Bank
- Frank Peacock and Jeff Jacobs, IRG

♦ *Meeting at the World Bank, July 14, 2004*
- Luiz Claudio Tavares, Senior Water and Sanitation Engineer Specialist, East Asia & Pacific Region, World Bank
- Frank Peacock and Jeff Jacobs, IRG

♦ *Meeting with US-ASEAN Business Council, July 27, 2004*
- Ernest Bower, President, US-ASEAN Business Council
- Doug Clark, Corporate Vice President, IRG

♦ *Meeting with USEPA, August 20, 2004*
- Susan Wickwire, Chief, International Capacity Building Branch, Climate Change Division, USEPA
- Kevin Rosseel, International Capacity Building Branch, Climate Change Division, USEPA
- Katherine Sibold, Manager, Integrated Environmental Strategies Program, Global Programs Division, USEPA
- Tony Pryor and Glen Anderson, IRG

Written Responses to United States-Asian Environmental Partnership (US-AEP) Questions for Strategic Assessment (Countries not visited by Assessment Team)

Cambodia

♦ Pam DeVolder, Economic and Labor Officer, US Embassy Phnom Penh

China

♦ Lixin Fu, Tshingua China

Nepal

♦ Sharada Jnawali, Urban Environment Program, USAID/Nepal
♦ Rajesh Manandhar, Engineer, Environment Department, Kathmandu Metropolitan City (KMC)
♦ Bhushan Tuladhar, Clean Energy Nepal
♦ Rajesh Manandhar, Engineer, Environment Department, Kathmandu Metropolitan City (KMC)
♦ Anil K. Raut, Kathmandu, NEPAL

Pakistan

- Arif Pervaiz, Head, Policy and International Agreements, IUCN-The World Conservation Union
- Hania Aslam, Toxics Programme, WWF - Pakistan

ANNEX 4: BACKGROUND MATERIALS AND REFERENCES

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  http://www.york.ac.uk/inst/sei/APMA/APMA.html
- Cities Alliance
  http://www.citiesalliance.org
- Clean Air Initiative for Asian Cities (CAI-Asia)
  http://www.cleanairnet.org/caiasia
- Global Development Alliance Partnerships
  http://www.usaid.gov/our_work/global_partnerships/gda/
- People and Planet, urban poverty, urban population trends, http://www.peopleandplanet.net/
- Southeast Asia Water Utilities Network – SEAWUN http://adb.org/Water/CFWS/SEAWUN.asp
- Water, Environment and Sanitation, UNICEF http://www.unicef.org/wes/index_wes_related.html
- Water for Asian Cities Program
  http://adb/Water/asian_cities.asp
- World Resources Institute, Global Trends, Population and Human Well-Being, Urban Growth
  http://www.wri.org/wr-98-99/citygrow.htm

Asian Environmental Compliance and Enforcement Forum

USAID FROM THE AMERICAN PEOPLE

US-AEP A Program of USAID

ADB

PROCEEDINGS

ASIAN ENVIRONMENTAL COMPLIANCE AND ENFORCEMENT FORUM:

Sharing International Experience on Environmental Compliance and Enforcement

Bangkok, Thailand
October 27-28, 2004

THE REGIONAL ENVIRONMENTAL CENTER for Central and Eastern Europe

INECE

OECD

The United States Agency for International Development (USAID) and the Asian Development Bank (ADB) jointly funded the publication of this report.

Planning and Development Collaborative International (PADCO), an AECOM Company, completed the proceedings under USAID contract LAG-I-0099-00035-00. For PADCO, Elizabeth Rosan Kirkwood, Paul Violette, Lisa Kircher Lumbao and Watcharee Limanon prepared the report.

In partnership with USAID, the Thailand Pollution Control Department (PCD) co-organized and hosted this regional forum on October 27-28, 2004 in Bangkok, Thailand to share international best practices on environmental compliance and enforcement and to explore strategies for establishing an Asian network.

PROCEEDINGS

Asian Environmental Compliance and Enforcement Forum:
Sharing International Experience in Compliance and Enforcement

October 27-28, 2004
Bangkok, Thailand

contents

tables and acronyms

TABLES

ACRONYMS

ADB	Asian Development Bank
AECEN	Asian Environment Compliance and Enforcement Network
ASEAN	Association of South East Asian Nations
APEC	Asia-Pacific Economic Cooperation
BERCEN	Balkan Environmental Regulatory Compliance and Enforcement Network
EPA	United States Environmental Protection Agency
IMPEL	EU Network for the Implementation and Enforcement of Environmental Law
INECE	International Network for Environmental Compliance and Enforcement
MONRE	Ministry of Natural Resources and Environment
NGO	Non-Government Organization
OECD	Organisation for Economic Co-operation and Development
PCD	Pollution Control Department of Thailand
REC	Regional Environmental Center for Central and Eastern Europe
REPIN	Regulatory Environmental Programme Implementation Network
SAARC	South Asian Association for Regional Cooperation
USAID	United States Agency for International Development
US-AEP	United States-Asia Environmental Partnership
UNEP	United Nations Environment Programme

summary

Over the last decade, coping with the economic, social and health impacts of urban and industrial pollution has become a major challenge for Asian nations. In response, Asian policymakers have created new environmental laws and institutions that incorporate international environmental principles, such as polluter pays, and also established improved governance systems that promote access to information, public consultation and access to justice.

While each country has made considerable progress establishing environmental regulatory systems, much work still remains in strengthening environmental compliance and enforcement. Throughout the region, governments have identified enforcement as a top priority, and are working to develop new solutions that both expand existing command-and-control capabilities and leverage community and market forces to help address technical, financial and human resource limitations.

US-AEP Environmental Regulatory Dialogue

Since 2000, the U.S.-Asia Environmental Partnership (US-AEP), a program of the United States Agency for International Development (USAID), has been working closely with Asian governments through its Environmental Regulatory Dialogue program to promote improved compliance and enforcement in Asia through country counterpart exchange. While each nation is at a different stage in policy development based on individual legal, institutional, political and social factors, all have a strong interest in exchange with Asian and U.S. counterparts.

Establishing a Practitioner Network in Asia

Environmental compliance and enforcement practitioner networks have proven effective mechanisms for promoting implementation of environmental laws, addressing transboundary pollution challenges and supporting economic integration and harmonization. Practitioner networks provide a mechanism for agency officials, prosecutors, judges, civil society leaders and others to exchange ideas and experience in developing new policies and practices and in building improved capacity.

Recognizing the need for a more comprehensive approach to compliance and enforcement, US-AEP and other donors decided to explore the benefits of operating an Asian practitioner network based in part on experience developed through the US-AEP Environmental Regulatory Dialogue program. As a first step in evaluating country interest and the potential benefits of an Asian network, US-AEP worked with agency partners in India, Philippines and Thailand to assess their environmental compliance and enforcement programs.

Country Program Assessment Results

Results from the three-country environmental compliance and enforcement program assessments identify common challenges, which provide a basis for regional exchange on compliance and enforcement. Common program challenges identified by the assessment results included: (1) overlapping and fragmented authority; (2) incomplete decentralization; (3) limited interagency coordination; (4) lack of standardized procedures; (5) weak human and institutional capacity; (6) limited public involvement; and (7) insufficient data and performance indicators.

In addition, partner agencies from India, the Philippines and Thailand developed recommendations for short-term and long-term reform measures aimed at strengthening environmental compliance and enforcement. Proposed short-term measures would enable the agencies to rely on existing legal authority to promote change, while long-term measures would require more comprehensive legal or institutional reforms.

Asian Environmental Compliance and Enforcement Forum

To gauge interest and explore strategies for establishing an Asian network, US-AEP and the Thailand Pollution Control Department (PCD) organized a regional forum on October 27 and 28, 2004 in Bangkok, Thailand for senior Asian environmental officials and other stakeholders from Europe and the United States. Participating Asian countries included China, Indonesia, India, Philippines, Sri Lanka, Thailand and Vietnam.

Over 80 participants joined the forum, including senior environmental officials, judges, lawyers and civil society leaders, as well as representatives from the U.S. Environmental Protection Agency (EPA), Asian Development Bank (ADB), World Bank, Organisation for Economic Co-operation and Development (OECD), International Network for Environmental Compliance and Enforcement (INECE) and Regional Environmental Center for Central and Eastern Europe (REC).

At the forum, participants unanimously endorsed the regional network and set an action agenda for its establishment that identified network objectives and activities, priority program areas, scope of implementation and organizational requirements. In addition, forum presentations and discussion included compliance and enforcement best practices, program indicators and lessons learned from other practitioner networks.

Action Agenda: Establishing an Asian Network

To gain insights into requirements and priorities for establishing a network in Asia, forum participants completed a questionnaire and joined facilitated discussions. Taken together, these recommendations form an action agenda for use by countries and donor partners in moving forward to establish an environmental compliance and enforcement network in Asia.

Objectives and Activities

The action agenda identified three main objectives and associated activities for the proposed environmental compliance and enforcement network: (1) promote the development and implementation of improved policies and institutions; (2) strengthen practitioner capacity; and (3) support regional sharing of best practices on compliance and enforcement.

As indicated in the table below, potential network activities would include: annual forum, pilot projects for new policies, regulations and procedures; assessments and studies; performance indicator development and tracking; practitioner trainings and tools; peer exchanges; website, publications and information databases; and linkages to other networks.

Network Objectives and Potential Activities

Objectives	Potential Activities
1. Promote the development and implementation of improved policies and institutions	• Pilot projects for new policies, regulations and procedures • Regional program assessments and studies • Performance indicator development and tracking • Regional guiding principles
2. Strengthen practitioner capacity	• Specialized practitioner trainings and tools • Performance indicator development and tracking • Peer exchanges
3. Support regional sharing of best practices on compliance and enforcement	• Annual forum • Peer exchanges • Website, publications and information databases • Linkages to other networks

Priority Program Areas

The action agenda identified the following top priority areas for network activities: (1) enforcement policies and authority; (2) institutional arrangements and decentralization; (3) compliance assurance; (4) self-monitoring, self-reporting, record-keeping; (5) public participation; and (6) economic instruments.

Scope of Implementation

Participants confirmed that while network activities should focus primarily on improved implementation of domestic legal requirements, the network should also include activities that address transboundary pollution. In addition, the network should not work exclusively on urban and industrial environmental impacts, but, where practical, should include natural resources or coastal zone impacts and management.

Organizational Requirements

In discussions on establishing and operating an Asian practitioner network, participants identified four primary organizational requirements: (1) country membership; (2) national coordinators; (3) executive committee; and (4) secretariat.

Asian Environmental Compliance and Enforcement Network (AECEN)

Representatives from PCD, US-AEP, ADB and OECD offered concluding remarks at the regional forum, affirming their commitment to support the establishment of the Asian Environmental Compliance and Enforcement Network (AECEN). While USAID will continue its support of this activity, ADB also committed to providing additional core funding to support network establishment and activity implementation.

As a next step, partner countries, donor agencies and networks will work together to begin implementation of the proposed action agenda, including establishing an interim executive committee to guide development of the network terms of reference, and support planning of a launching workshop in 2005 in Manila. The interim executive committee will invite new member countries and other donor partners to join AECEN.

introduction

Environmental Compliance and Enforcement as Top Priority

Over the last decade, coping with the economic, social and health impacts of urban and industrial pollution has become a major challenge for Asian nations. In response, Asian policymakers have created new environmental laws and institutions that incorporate international environmental principles, such as polluter pays, and also established improved governance systems that promote access to information, public consultation and access to justice.

While each country has made considerable progress establishing environmental regulatory systems, much work still remains in strengthening environmental compliance and enforcement. Throughout the region, governments have identified enforcement as a top priority, and are working to develop new solutions that both expand existing command-and-control capabilities and leverage community and market forces to help address technical, financial and human resource limitations.

US-AEP Environmental Regulatory Dialogue

Since 2000, the U.S.-Asia Environmental Partnership (US-AEP), a program of the United States Agency for International Development (USAID), has been implementing its Environmental Regulatory Dialogue program in partnership with the U.S. Environmental Protection Agency (EPA) to promote the adoption and implementation of improved environmental laws, policies and institutional arrangements in Asia. US-AEP countries include India, Indonesia, Philippines, Sri Lanka, Thailand and Vietnam.

Core program areas include:

- Compliance and enforcement
- Community and citizen participation
- Environmental law and governance
- Economic instruments and environmental funds

The cornerstone of the Environmental Regulatory Dialogue program is counterpart exchange particularly between countries in the region. While each country is at a different stage in policy development due to legal, institutional, political and social factors, all have a strong interest in exchange with Asian and U.S. counterparts. Partners include government agency officials, legislators, judges, communities, and civil society and business leaders.

"Through the United States-Asia Environmental Partnership, the United States Agency for International Development and the United States Environmental Protection Agency work in partnership with government agencies, legislatures, cities, communities and courts to strengthen environmental laws and institutions. These collaborative partnerships have led to a new clean water act in the Philippines, an environmental fund in Vietnam and an environmental dispute resolution center here in Thailand."

H.E. Darryl N. Johnson
U.S. Ambassador to Thailand

Under the Environmental Regulatory Dialogue program, US-AEP has worked with partners in multi-year projects through a partnership approach that includes:

1. Identifying country priorities and comparative advantages;
2. Providing technical assistance to help formulate new policies, laws, regulations and institutions;
3. Facilitating technical exchange and dialogue with counterparts;
4. Implementing pilot projects to achieve results on the ground; and
5. Supporting policy implementation through training and skills development.

Table 1 highlights recent policy and institutional advances developed in part through counterpart exchange under the US-AEP Environmental Regulatory Dialogue program.

Table 1
US-AEP Environmental Regulatory Dialogue: Catalyzing Policy and Institutional Advances

Country	Policy Advance / Institution	Partner Countries
Thailand	Environmental chambers ("green benches") in courts	India
Philippines	Decentralization of agency environmental adjudication	United States
Thailand	Environmental dispute prevention and resolution	United States, Philippines
Thailand	Public consultation in environmental decision-making	United States
Vietnam	Community participation in watershed protection	Philippines, Thailand
Thailand	Self-monitoring regulation for industrial sources	United States, Taiwan
Philippines	Water quality permitting	United States, Taiwan
Vietnam	Wastewater pollution charges	Philippines, Malaysia
Vietnam	Environment funds	Thailand, Poland

Establishing a Practitioner Network in Asia

To expand on current US-AEP efforts to promote compliance and enforcement in the region, US-AEP and other donor partners explored the benefits of establishing a practitioner network. While there are international and regional networks that address specific country needs and interests, there is currently no network in Asia *(see Table 6)*.

International and regional practitioner networks have proven to be effective strategies for promoting improved environmental compliance and enforcement, addressing transboundary pollution challenges and supporting economic integration and harmonization.

Regional practitioner networks provide a mechanism for agency officials, prosecutors, judges, civil society leaders and others to exchange ideas and experience in developing new policies and practices, and building improved capacity.

Assessing Compliance and Enforcement Programs in Asia

As a first step in evaluating practitioner interest and the potential benefits of establishing a network in Asia, US-AEP worked with agency partners in India, Philippines and Thailand to assess their environmental compliance and enforcement programs. US-AEP partnered with agency officials and other stakeholders in each county to complete a questionnaire, identify program strengths and weaknesses and develop recommendations for improving environmental policies and practices, and building institutional capacity.

Asian Environmental Compliance and Enforcement Forum

To explore strategies for creating an Asian practitioner network, share country program assessment results, and present innovative strategies and pilot activities for strengthening environmental compliance and enforcement, US-AEP and the Thailand Pollution Control Department (PCD) convened a regional forum on October 27 and 28, 2004 in Bangkok, Thailand for senior Asian environmental officials and other stakeholders.

Over 80 participants attended this program, including senior environmental officials, judges, lawyers and civil society leaders from China, Europe, Indonesia, India, Philippines, Sri Lanka, Thailand, United States and Vietnam, as well as representatives from the Asian Development Bank (ADB), World Bank, Organisation for Economic Co-operation and Development (OECD), International Network for Environmental Compliance and Enforcement (INECE) and Regional Environmental Center for Central and Eastern Europe (REC). *(See Appendix 1 for workshop agenda.)*

As a result of group discussions, participants unanimously endorsed the establishment of a regional network dedicated to promoting environmental compliance and enforcement in Asia. As a first step in establishing this new regional practitioner network, participants identified network objectives and activities, priority program areas, scope of implementation and potential organizational arrangements.

Outline of Proceedings

The forum proceedings provide a summary of assessment findings and workshop proceedings in three parts:

Part 1: Country Program Assessment Results

Provides a summary of the country program assessment results, including regional program challenges and short- and long-term recommendations for each surveyed country.

Part 2: Regional Forum Proceedings

Presents highlights and outcomes of case study presentations and group discussions.

Part 3: Action Agenda on Establishing an Asian Network

Outlines an action agenda developed by participants for establishing a practitioner network dedicated to environmental compliance and enforcement.

country program assessment results part I

To gain a preliminary understanding of the potential need for a regional compliance and enforcement practitioner network, US-AEP worked with partner environmental agencies in India, Philippines and Thailand in 2004 to complete an assessment of each country's environmental compliance and enforcement program. US-AEP developed the survey based in part on U.S. EPA's *Principles of Environmental Enforcement*. Successful environmental compliance and enforcement programs share common principles and practices that contribute to their effectiveness and long-term sustainability *(see Table 2)*.

Table 2
Principles of Effective Compliance and Enforcement Programs

- Make compliance and enforcement a government priority
- Establish enforceable legal and regulatory requirements
- Determine the optimal degree of centralization and establish clear roles and responsibilities
- Optimize use of limited resources and information by targeting priority sectors and pollution hot spots
- Evaluate relative importance of compliance promotion versus enforcement response to violations based on economic, social and cultural factors
- Strengthen human and institutional capacity to meet program needs and priorities
- Develop standardized compliance assurance procedures to promote transparent, effective and fair program implementation
- Apply incentive-based approaches that include pollution charges, public disclosure and financing programs that complement regulatory measures
- Leverage public participation to encourage compliance and promote community involvement
- Develop effective data collection and information management systems
- Evaluate program success with indicators that monitor operations to promote accountability and improve program performance

Assessment Methodology, Objectives and Focus Areas

To complete the assessment survey, agency officials and practitioners in the three countries provided written responses to a questionnaire, followed by interviews with US-AEP. Together, agency partners and US-AEP completed the survey report, which was presented at the regional workshop.

The **objectives of this three-country assessment** were to:

- Identify country compliance and enforcement program capabilities and limitations;
- Develop recommendations for improved laws, institutions, procedures and practices and strengthened capacity; and
- Identify common challenges to provide a basis for regional dialogue.

"Our most pressing challenge is finding ways to create solutions within the existing legal and institutional framework. In my experience, too often government officials find it too easy to cite limitations in laws or institutional arrangements, rather than to develop solutions within the constraints of our existing systems. We have enough law, but not enough law enforcement."

Mr. Petipong Pungbun Na Ayudhya, Permanent Secretary of Thailand's Ministry of Natural Resources and Environment (MoNRE)

The assessment survey addressed **six primary components** of environmental compliance and enforcement programs:

1. Legal authority and institutional arrangements;
2. Compliance monitoring – inspections, self-monitoring, permitting;
3. Compliance assistance and data management;
4. Enforcement response;
5. Public participation and economic instruments; and
6. Compliance and enforcement program indicators.

Regional Compliance and Enforcement Program Challenges

Assessment results from the three countries reveal common challenges, which provide a basis for regional exchange on compliance and enforcement *(see Table 3)*.

Table 3
Common Program Challenges

Overlapping and fragmented authority	Due to complex legal arrangements or political factors, multiple agencies are responsible for compliance and environment.
Incomplete decentralization	While national laws and policies require decentralization of compliance and enforcement functions, implementation has been incomplete and many functions still remain with central government agencies.
Limited interagency coordination	With multiple agencies responsible for promoting compliance and enforcement, there is often limited interagency coordination and cooperation.
Lack of standardized procedures	Agencies have been slow to develop clear procedures to support source monitoring, inspection, and enforcement.
Limited capacity	Environmental agencies at central, regional and local levels do not have the necessary human and institutional capacity to meet all legal mandates and administrative responsibilities.
Limited public involvement	While citizen participation is recognized as a critical factor in assisting agencies to monitor compliance and enforcement requirements, agencies lack the necessary resources to promote effective public participation.
Insufficient data and performance indicators	Insufficient data or data management systems limit agency ability to implement effective compliance and enforcement programs, or measure the outcomes or impacts of these programs.

Short-Term and Long-Term Recommendations

Based on the assessment survey, each country developed recommendations for short-term and long-term reform measures aimed at strengthening environmental compliance and enforcement. Proposed short-term measures would enable the agencies to rely on existing legal authority to promote change, while long-term measures would require more comprehensive legal or institutional reforms. Table 4 provides a summary of each country's recommendations.

Table 4
Country Program Assessment Recommendations

Country	Short-term recommendations	Long-term recommendations
THAILAND	• Exercising existing compliance and enforcement authority; • Strengthening overall interagency coordination and cooperation; • Developing uniform compliance monitoring and enforcement procedures to promote decentralization and consistency; • Establishing strategic outreach programs for the regulated community; • Strengthening overall public participation by providing access to information and by publicizing enforcement stories; • Increasing environmental knowledge and expertise at all government levels; and • Developing environmental compliance and enforcement indicators to measure performance.	• Legal reform to establish a single ministry responsible for compliance and enforcement; • Decentralization to empower regional, provincial and local officials with increased enforcement responsibilities and functions; • Creative financing arrangements and/or economic incentives to encourage compliance; and • Amended laws and polices to promote public participation and to establish meaningful sanctions that deter potential violators.
PHILIPPINES	• Completing the reorganization of the Environmental Management Bureau (EMB); • Completing and implementing a multimedia, industry-specific checklist system for monitoring and inspections; • Optimizing use of self-monitoring reports; • Incorporating improved and feasible enforcement measures within the implementing rules and regulations of the Clean Water Act; and • Conducting pilot testing on the decentralization of the Pollution Adjudication Board (PAB).	• Improved policies and procedures to clarify/specify roles of national agencies and local governments, consistent with devolution of powers and authorities to local governments under recent laws; • Development and implementation of economic instruments to encourage compliance and generate funds for monitoring and enforcement; and • Expanded PAB jurisdiction to include all types of pollution cases and not only violations of standards.
INDIA	• Improving inter-governmental cooperation; • Developing standard policies and procedures for compliance monitoring and enforcement response; • Developing self-monitoring regulations to shift the burden to the regulated community; • Strengthening staff capacity in compliance and enforcement efforts; • Increasing the Central Pollution Control Board's (CPCB) outreach capacity; • Improving access to information and promoting improved public participation; • Establishing standardized indicators for program performance evaluation; and • Strengthening information management systems.	• Procedures to eliminate overlap between the Air Act, Water Act and the Environmental Protection Act; • Improved institutional arrangements to better coordinate CPCB and State Pollution Control Boards (SPCBs); • Amended laws empowering enforcement agencies to introduce incentive-based instruments; • Expanded scope for Appellate Authorities to avoid proliferation of public interest litigation; • Increased financial assistance and incentives for improved compliance; and • Amended laws to introduce carbon emission taxes and include alternative dispute resolution (ADR) mechanisms.

part 2 regional forum proceedings

To explore strategies for creating an Asian practitioner network, US-AEP and the Thailand Pollution Control Department (PCD) convened a regional forum on October 27 and 28, 2004 in Bangkok, Thailand. Over 80 participants attended this two-day program, including senior officials, judges, lawyers and civil society leaders from China, Europe, Indonesia, India, Philippines, Sri Lanka, Thailand, United States and Vietnam, as well as representatives from ADB, World Bank, OECD, INECE and REC.

Primary forum objectives included:

- Sharing country program assessment results;
- Presenting innovative strategies and pilot activities for strengthening environmental compliance and enforcement in the region; and
- Exploring strategies for establish a regional practitioner network.

As detailed in the program agenda *(Appendix 1)*, in addition to country program assessment results, forum presentations and discussion included three main areas:

- Compliance and enforcement best practices;
- Compliance and enforcement program indicators; and
- Lessons learned from other practitioner networks.

"Cooperation is at the heart of protecting our environment. If there is any lesson from the last three decades, it is this: Government officials, judges, big city mayors, local village leaders, news reporters, common citizens and even school children all have a role to play, and must work together... Through our actions and our decisions, we must light the way with new ideas that reach all parts of our societies, and create new ways to work together to protect our natural heritage."

Justice Vijender Jain,
Delhi High Court, India

Distinguished guest speakers at the workshop, from left: Mr. James Waller, Regional Environmental Affairs Officer; H.E. Mr. Darryl N. Johnson, U.S. Ambassador to Thailand; Justice Jain, Delhi High Court, India; and Mr. Petipong Pungbun Na Ayudhya, Permanent Secretary of Thailand's Ministry of Natural Resources and Environment.

Workshop Participants

In addition, as detailed in Part 3, participants shared experience and ideas on strategies and requirements for establishing a regional practitioner network for Asia.

A. Regional Best Practices on Environmental Compliance and Enforcement

Based in part on the assessment results, workshop presentations focused on four core areas of environmental compliance and enforcement: (1) permitting, monitoring and inspection; (2) institutional arrangements and decentralization; (3) enforcement actions and responses; and (4) economic instruments and other incentive-based approaches. Presentations highlighted individual country successes, while panel discussions addressed implementation challenges.

1. Permitting, Monitoring, and Inspection Policies and Practices

Compliance monitoring is essential to detecting and correcting violations, providing evidence to support enforcement actions, promoting deterrence and evaluating overall program progress. The most important tools and methods for compliance monitoring include: (1) inspections; (2) information collection requests; (3) self-monitoring/self reporting; (4) citizen monitoring/complaints; and (5) area monitoring of ambient conditions. At the forum, environmental agencies in Thailand and the Philippines presented progress on pilot activities completed in 2004 in partnership with US-AEP and EPA.

Thailand

Development of New Self-Monitoring and Self-Reporting Regulations

Mr. Burachatr Akkaraporn, Environmental Inspector, Pollution Control Department

Thailand has developed draft regulations for selected industries on self-monitoring, self-reporting and recordkeeping to provide access to performance information, reduce enforcement costs and better inform the regulated community about compliance requirements. PCD initiated this project by hosting two separate workshops to secure stakeholder input from regulatory agencies, industry and civil society, as well as technical expertise from international experts in India, Philippines, Taiwan, Vietnam and the U.S.

In developing this proposed regulation, PCD faced challenges in creating comprehensive reporting forms and gaining cooperation and support from the regulated community and local governments. In 2005, PCD will pilot test its draft self-monitoring regulations for specific water and air parameters on a voluntary basis with target industries located in Bangkok and neighboring provinces.

Philippines

Use of Inspection Checklists for Strengthening Compliance, Monitoring and Enforcement

Mr. Virgilio Fabronero, Chief of Pollution Control Division, Region 6, Environmental Management Bureau, Department of Environment and Natural Resources

To strengthen enforcement, standardizing compliance assurance procedures is a top priority of the Environmental Management Bureau (EMB). In 2004, EMB Region 6 pilot tested an inspection checklist to improve and standardize their inspection process. The objectives of the checklist were to assist inspectors with identifying vital information for their narrative reports, determine compliance with specific permit conditions, standards and existing regulations, and target individual violators or sectors for noncompliance.

During the three-month pilot, EMB concluded that industry-specific checklists helped inspectors: (1) improve inspection reports, especially for air and water; (2) eliminate the practice of putting permit information "on file;" (3) identify facility expansions with the required list of equipment information; and (4) provide substantive data for use in the emissions inventory.

As a next step, EMB Region 6 recommended developing other industry-specific checklists for industries like electroplating, cement and pulp and paper factories, drafting an inspection manual and establishing an agency-wide regulation mandating the use of checklists to guide all environmental inspections.

From left: Mr. Nathan Sage, US-AEP Country Manager Vietnam; Ms. Mamie Miller, Chief, Air Compliance Branch, US EPA; Mr. Paul Violette, Senior Policy Advisor, US-AEP; Mr. Ceazar Natividad, Engineer, Laguna Lake Development Authority.

2. Institutional Arrangements and Decentralization Efforts

Promoting effective compliance with environmental requirements requires strong coordination among implementing agencies at the national, regional and local levels. In Asia, governments are moving to decentralize environmental compliance and enforcement functions and responsibilities, since sub-national and local authorities often are closer to environmental problems and can respond more quickly. Presentations from Sri Lanka and China addressed strategies adopted in decentralizing core environmental compliance and enforcement functions.

Sri Lanka

Central Environmental Authority of Sri Lanka and its Role in Environmental Management

Ms. Manel Jayamanna, Director General, Central Environmental Authority

In 2004, Sri Lanka's Central Environmental Authority (CEA) initiated an effort to decentralize environmental functions to address environmental impacts brought about by rapid economic growth. Central to this effort was the creation of four sub-regional offices with core environmental responsibilities, including: implementing and enforcing laws at the regional level; establishing regional environmental priorities and programs; partnering and liasing with provincial and local governments; coordinating and resolving environmental impact assessment issues; and promoting public awareness and education of environmental issues.

In implementing this program, CEA faced several challenges. In particular, decentralization was hampered by limited resources (human, technical and financial), weak inter-agency communication and coordination, unclear guidelines for standard operating procedures and limited institutional structures to support regional offices. Despite these challenges, CEA remains optimistic and open to new ideas as it moves forward in implementing agency decentralization requirements.

China

Strengthening State-Level Enforcement Capabilities

Mr. Chen Shanrong, Deputy Director General, State Environmental Protection Administration

China's main environmental law, the Environmental Protection Law, grants the State Environmental Protection Administration (SEPA) and its partners at the provincial, city and county levels primary enforcement authority. Decentralization efforts are under way to promote improved compliance and inspection at the local level, since the majority of China's 45,000 inspectors work for the city and provincial EPAs.

To help strengthen environmental enforcement at the sub-national levels, inspectors are receiving more regular staff training and working with upgraded technical equipment and tools to conduct inspections. In addition, on-site inspection practices are improving with new standardized procedures, public disclosure efforts, more stringent environmental discharge standards and increased penalties.

With enhanced state and local-level capabilities, SEPA is developing an environmental public disclosure system in the cities of Huhhot and Zhenjiang. Under this program, inspectors rate the environmental performance of facilities using a color rating system and then disclose results to the mass media. Green, for example, indicates the facility has achieved international environmental standards, while black implies the facility must

alter its actions because it seriously violates both national and local environmental standards. As a result of this program, polluting enterprises are under increasing pressure to clean up their operations. Given this success, the program is now being piloted in more than 30 cities across China.

3. Enforcement Actions and Responses

Enforcement actions are essential to ensuring compliance, correcting violations and redressing harm. In addition, regular enforcement practices promote predictability within the regulated community and help strengthen an agency's credibility. Effective enforcement actions also remove the economic benefit of non-compliance, thereby leveling the playing field and establishing a deterrent effect among industry. Ultimately, a strong enforcement program should result in pollution prevention and waste minimization and lead to overall environmental improvements. Presentations from the Philippines and India illustrated various effective enforcement strategies.

Philippines

Strengthening Enforcement Response in Laguna de Bay

Mr. Ceazar Natividad, Engineer, Laguna Lake Development Authority, DENR

In the face of increased agricultural and industrial pollution entering Laguna Lake – the largest lake in the Philippines – the Laguna Lake Development Authority (LLDA) developed a discharge permit system based on environmental user fees (i.e., pollution charges) and aggressively enforced permit violations. For industrial users, LLDA discharge permits for biological oxygen demand (BOD) include a fixed fee and a variable fee based on the amount of pollution discharged. As a condition of each permit, facilities must comply with effluent standards, submit quarterly self-monitoring reports to LLDA, use flow measuring devices and appoint an accredited pollution control officer to conduct compliance monitoring for the facility.

To ensure facilities comply with permit requirements, LLDA has applied a range of enforcement responses, including issuing notices of violation and cease and desist orders, collecting monetary penalties and closing down facilities. LLDA has also established an administrative review board to adjudicate complaints against agency decisions. As a direct result of LLDA's permitting and enforcement program, BOD levels due to industrial pollution in the lake have declined significantly. The industrial sector now only constitutes 19 percent of the BOD loading compared to 30 percent in 1996.

India

Public Interest Litigation in India

Mr. Amarjit Singh Chandhiok, Asia Pacific Jurist Association

Public interest litigation (PIL) in India has evolved as a key judicial strategy to provide access to justice for all citizens and to protect against environmental degradation. Based on the Constitution, the Supreme Court and High Courts of India have relaxed standing requirements for environmental cases so that a citizen or public interest group can file a complaint on behalf of a disadvantaged class of persons without having suffered a specific legal injury or harm themselves.

The Supreme Court and a number of High Courts in major cities, including Mumbai, Kolkata, Chennai and Gujarat, have established "green benches" to adjudicate environmental cases. These activist courts have ruled on important environmental cases involving gas leaks, forest encroachment, pollution and traffic regulations. In one well-known case, courts established a remedy for protecting the Taj Mahal from harmful air pollutants by relocating industrial facilities and regulating the use of vehicles.

4. Economic Instruments and Other Incentive-Based Approaches

As a complement to traditional command-and-control regulations, governments in Asia are developing new strategies that leverage economic instruments and other incentives in promoting environmental compliance. Examples of approaches that leverage community and market forces include pollution charges, tradable permits, subsidies, offset approaches, tax incentives and subsidies, environmental labeling and public disclosure. Indonesia and Vietnam are implementing new strategies that illustrate the effectiveness of these approaches.

Indonesia

Promoting Compliance through Public Disclosure

Mrs. Hermien Roosita, Assistant Deputy for Manufacturing, Infrastructure and Service Affairs, Ministry of Environment

As part of a government initiative to promote improved environmental compliance, the Indonesian Ministry of Environment re-launched a public disclosure environmental rating system in 2003 called PROPER (Program for Pollution Control and Rating Evaluation). The main objectives of this program are to: (1) improve compliance with environmental regulations; (2) reduce air, water and hazardous waste pollution through cleaner technologies; and (3) encourage polluters to adopt environmental management systems, resource management policies and international standards, such as ISO certification.

PROPER's five-color rating scheme – gold, green, blue, red and black – has proven to be a simple and effective method for communicating a facility's environmental performance to the public. PROPER assesses all aspects of a company's environmental management system, relationship with the community, and compliance with water, air pollution, waste and planning requirements. A gold rating indicates near zero emission levels, while black signifies no pollution controls at all. Agency officials refer companies with black ratings to environmental law enforcement officials.

Implementation of this approach relies on strong provincial and local participation to monitor, sample and evaluate emission and effluent data on facilities, and an on-going communication strategy to disclose company ratings to the public. To date, PROPER has sent a clear message to polluters; in just two years, the number of facilities with a black rating has dropped from 40 percent to 4 percent.

Experts from other international environmental and compliance networks share their experiences. From left: Mr. Paul Violette, Senior Policy Advisor, US-AEP; Mr. Mihail Dimovski, BERCEN Secretariat; Ms. Angela Bularga, OECD/REPIN Secretariat; Mr. Ken Markowitz, INECE Secretariat.

Vietnam

Launching a National Wastewater Pollution Charge System

Mrs. Nguyen Thi Kim Dzung, Principal Economic Research Fellow, Central Institute for Economic Management

To promote compliance with environmental standards and encourage facilities to adopt cleaner technologies, in January 2004 Vietnam enacted Prime Ministerial Decree 67, requiring industrial and domestic polluters to pay a fee for wastewater discharges. Following consultations with provincial departments and industrial polluters, the Ministry of Finance and the Ministry of Natural Resources and Environment issued a government circular defining the pollution charge program procedures, which will be implemented in large part by provincial and city agencies.

In particular, implementing agencies are required to collect fees from industries based on a sectoral analysis of pollutant loads and self-reported performance information. In accordance with the decree, a percentage of pollution charge revenues will be directed to a national-level environmental fund to enable new environmental investments to businesses through loans and grants.

Provinces or cities with existing revolving funds, such as Hanoi, can use their revenues to make local environmental investments. As this program is further implemented, the environmental protection fees will be based on actual discharged amounts and pollution concentrations rather than estimated amounts.

H.E. Darryl N. Johnson, U.S. Ambassador to Thailand, discusses the importance of regional partnerships in an interview with the Thai Press.

B. Environmental Compliance and Enforcement Program Indicators

Developing and tracking program indicators enables decision-makers to evaluate compliance and enforcement program effectiveness, and to make more informed management decisions on program implementation. To assist countries in promoting improved compliance, practitioner networks typically work with members to develop and track performance indicators. As part of the forum, experts from INECE and EPA presented information and experience on performance indicators.

Performance Indicators for Environmental Enforcement and Compliance Programs

Mr. Kenneth Markowitz, INECE Secretariat

Performance indicators are a key tool for decision-makers developing and implementing environmental compliance and enforcement programs. Indicators allow decision-makers to: (1) monitor and control the program operations; (2) ensure accountability to legislative bodies, budget authorities, constituent groups and the public; and (3) improve overall program performance.

Many environmental authorities commonly evaluate their enforcement capabilities and activities with input and output indicators. Input indicators track financial and human resources allocations (i.e., staff, funding, materials), while output indicators describe particular activities, such as the number of enforcement cases or the number of fines issued per year. While these traditional indicators provide some measure of program activities, they do not capture program results or impacts *(see Table 5)*.

As a result, countries are increasingly developing program indicators that measure intermediate and final outcomes. Intermediate outcome indicators measure changes in knowledge, behavior or conditions that result from program activities, while end outcome indicators aim to measure overall environmental improvements related to compliance and enforcement efforts. Experience in developing such indicators is expanding rapidly as more and more countries with transitional and emerging economies are launching pilot programs on environmental compliance and enforcement indicators.

Table 5
Types of Performance Indicators

Type of Indicator	What it Measures	Examples
Input	Resources	• Personnel • Funds for salaries, contracts, IT, etc.
Output	Activities	• Inspections conducted • Enforcement actions taken • Fines assessed
Intermediate Outcome	Behavior Change	• Greater understanding of how to comply • Improved facility management practices • Increased compliance
Final Outcome	Environmental Impact	• Reduced pollution emissions • Improved ambient water quality • Reduced contaminant burden in wildlife species

Table 6
Environmental Compliance and Enforcement Practitioner Networks

	IMPEL (1992)	REPIN (1999)	BERCEN (2001)	INECE (1989)
	EU Network for the Implementation and Enforcement of Environmental Law europa.eu.int/comm/environment/impel/	Regulatory Environmental Programme Implementation Network www.oecd.org	Balkan Environmental Regulatory Compliance and Enforcement Network www.rec.org	International Network for Environmental Compliance and Enforcement www.inece.org
Mission	To protect the environment by the effective implementation of European law.	To enable environmental authorities and other stakeholders in Eastern Europe Caucus and Central Asia (EECCA) countries to provide protection of the environment and human health by developing and implementing environmentally effective, economically efficient environmental policies and legislation, and ensuring compliance with environmental requirements.	To increase the effectiveness of enforcement agencies and promote compliance with environmental requirements.	To contribute to a healthy and clean environment, sustainable use of natural resources and the protection of ecosystem integrity through effective compliance and enforcement of environmental laws using regulatory and non-regulatory approaches.
Member Countries / Region	29 countries: all Member States of the European Union (EU); 10 future Member States; 3 candidate countries: Bulgaria, Romania and Turkey; and Norway, European Commission (Region: EU)	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan (Region: EECCA)	Albania, Bosnia and Herzegovina, Croatia, FYR Macedonia, Serbia and Montenegro, and Bulgaria and Romania are permanent observers (Region: South Eastern Europe (SEE))	2,500 members, including USEPA, Netherlands, BERCEN, IMPEL, REPIN, European Commission (Region: Global)
Organizational Structure	• Secretariat (housed at EU's Environmental Directorate General Office in Brussels) • Member States • National Coordinators • 2 plenary meetings/year co-chaired by the European Commission	• Secretariat (housed at OECD in Paris) • Member countries • National Coordinators • 1 plenary meeting/year	• Secretariat (housed at the Regional Environmental Center (REC) in Szentendre, Hungary) • Member countries • National Network Coordinators • At least 1 plenary meeting/year co-chaired by the European Commission and the REC	• Secretariat (housed at Earthpace in Washington DC) • Executive Planning Committee (EPC) • 1 plenary meeting/year • International Conferences every 2-3 years • "Network of networks"
Work Programs and Activities	IMPEL's two programmatic areas include: 1. The Minimum Criteria for Inspections Programme includes trainings and publications on general principles, best practices for environmental inspectors. 2. The Permitting and Monitoring Programme under the 6th Environmental Action Programme aims to improve compliance monitoring and permitting legislation and implementation practices.	REPIN's three programmatic areas include: 1. Strengthening Environmental Policy Instruments • permitting, standards, reform 2. Strengthening Environmental Enforcement Instruments • economic and financial aspects of compliance assurance policies 3. Strengthening Capacity of Environmental Agencies • indicators, peer reviews	Main BERCEN activities concern training of environmental inspectors and exchange of experience through exchange programs, study tours, peer review assessments, national trainings and participation in other networks.	INECE's work centers on (1) developing networks for enforcement cooperation, (2) strengthening capacity for compliance and enforcement, and (3) raising awareness of the importance of environmental compliance and enforcement. Key INECE activities include: • Organize international conferences on environmental compliance and enforcement • Develop Environmental Compliance and Enforcement (ECE) Indicators • Update website

C. Lessons Learned from Compliance and Enforcement Practitioner Networks

Environmental compliance and enforcement practitioner networks provide a platform for policy-makers, officials and other practitioners (e.g., prosecutors, judges, civil society leaders and experts) to share experience in the development and implementation of environmental policies and practices. While each network has a different mission, activities and organizational structure, all networks work in direct consultation with members to address specific country and regional priorities *(see Table 6)*.

To assist decision-makers in understanding the potential benefits of establishing a practitioner network in Asia, representatives from the secretariats of international and regional networks joined the forum to share practical knowledge and experience in establishing and operating environmental compliance and enforcement practitioner networks. Network representatives emphasized the importance of collaborative exchange between member countries in policy development and capacity building activities, as well as between other networks and donors to leverage experience, capabilities and knowledge.

International Network for Environmental Compliance and Enforcement (INECE)

Mr. Kenneth Markowitz, INECE Secretariat

Founded in 1989, INECE is a global network dedicated to promoting effective compliance and enforcement of domestic environmental laws and international environmental agreements through networking, capacity building and cooperation. INECE is a partnership among government and non-government compliance and enforcement practitioners from over 100 countries.

INECE's mission is to: (1) raise awareness on the importance of environmental compliance and enforcement; (2) strengthen capacity for compliance and enforcement through training and issue analysis; and (3) develop networks for enforcement cooperation. INECE aims to raise awareness and disseminate information to practitioners through its website, workshops, conferences and newsletters. INECE promotes cooperation in target areas and helps strengthen regional networks worldwide.

Regulatory Environmental Programme Implementation Network (REPIN)

Ms. Angela Bularga, OECD Secretariat

REPIN was formed in 1999 to assist environmental enforcement authorities in Eastern Europe Caucasus and Central Asia (EECCA), which faced significant environmental challenges. REPIN's objectives are to improve enforcement agencies and instruments based on best international practices and cost effectiveness, to transfer knowledge and skills, to re-shape relations between the agencies and regulated community, to develop effective environmental policies and legislation, and to stimulate international cooperation/harmonization and economic integration.

REPIN activities center on promoting development of environmental policy instruments, improving compliance assurance strategies and tools, and increasing performance of environmental enforcement agencies in member countries. To implement these activities, REPIN develops comprehensive studies, policy reports and tools; organizes specialized trainings and workshops to present practices and exchange experiences on prior-

ity areas; and implements pilot projects and disseminates information among all relevant stakeholders. REPIN's accomplishments include capacity building efforts for inspectors and development of guiding principles documents on environmental and permitting system reform initiatives, among many others.

Balkan Environmental Regulatory Compliance and Enforcement Network (BERCEN)

Mr. Mihail Dimovski, BERCEN Secretariat

Comprised of member countries in South Eastern Europe (SEE), BERCEN has been working since 2001 to facilitate, assist and promote enforcement of regulations by disseminating information and developing demonstration projects. BERCEN serves as a forum for exchanging best practices, fostering regional cooperation and improving overall enforcement within member countries.

To facilitate dialogue, BERCEN organizes study tours, peer reviews, train-the-trainer and exchange programs for environmental inspectors; develops assessments of existing enforcement programs; identifies priority areas for reform; and organizes annual plenary meetings for members to engage in strategic discussions about the network's activities and share lessons learned on compliance.

BERCEN's organizational structure consists of a secretariat and national coordinators. The secretariat plays a key role in managing and implementing program activities, while the national coordinators identify country priorities and work closely with the secretariat and country leaders to implement program activities. BERCEN closely coordinates with REPIN, IMPEL and INECE.

Key Recommendations for Launching a Network

In presenting their experience, representatives from REPIN and BERCEN offered key points for consideration by Asian decision-makers in launching a practitioner network. While the proposed network's mission, organizational structure and activities will depend on country and regional priorities and available resources, there are some key lessons to be learned from the European experience. Table 7 summarizes key recommendations for launching a network.

Table 7
Key Recommendations for Launching a Network

- Proceed from needs and clear objectives;
- Agree on a practical work program that focuses on specific products and results;
- Rely on strong stakeholder ownership and political commitment;
- Define clearly the responsibilities of key network participants, including the secretariat;
- Maintain a link to key decision-makers to ensure political support;
- Focus on human capacity development and commitment as main driving forces for change;
- Maintain strong stakeholder communication, including with the general public;
- Develop and apply indicators to measure progress and results; and
- Interact and cooperate with international networks and partners.

In sharing their experience, representatives from the three networks expressed their interest in continued cooperation and support in the creation of a practitioner network in Asia.

establishing an asian network

part 3

To gain insights into requirements and priorities for establishing a network in Asia, forum participants from China, India, Indonesia, Philippines, Sri Lanka, Thailand and Vietnam completed a questionnaire and joined facilitated discussions. Key topics of discussion included:

- Establishment of an Asian network,
- Objectives and activities,
- Priority program areas,
- Scope of implementation, and
- Organizational requirements.

Taken together, the results of these discussions form an action agenda for use by countries and donor partners in moving forward to establish the Asian environmental compliance and enforcement network.

Establishment of an Asian Network

As a key threshold issue, participants unanimously supported the establishment of a regional compliance and enforcement network for Asia. Participants agreed that a practitioner network would serve as a valuable resource for strengthening compliance with environmental requirements in their individual countries, and also provide a platform for addressing regional transboundary environmental challenges.

Objectives and Activities

Based on survey questions and discussions, participants identified three main objectives of the proposed environmental compliance and enforcement network:

- Promote the development and implementation of improved policies and institutions,
- Strengthen practitioner capacity, and
- Support regional sharing of best practices on compliance and enforcement.

To achieve these objectives, workshop participants identified potential network activities. Priority activities included in-country pilot projects to support formulation and development of new policies, regulations and procedures, as well as an annual forum that would facilitate sharing of best practices, experience and information. Table 8 provides a summary of potential network activities.

"Enforcement has become a top priority for Thailand, but also for our neighbors. Only by coming together as partners under a sustainable network can we share ideas and techniques that will enable each country to tackle our common challenges."

Dr. Supat Wangwongwatana,
Deputy Director General,
Thailand Pollution
Control Department

Table 8
Network Objectives and Potential Activities

Objectives	Potential Activities
1. Promote the development and implementation of improved policies and institutions	• Pilot projects for new policies, regulations and procedures • Regional program assessments and studies • Performance indicator development and tracking • Regional guiding principles
2. Strengthen practitioner capacity	• Specialized practitioner trainings and tools • Performance indicator development and tracking • Peer exchanges
3. Support regional sharing of best practices on compliance and enforcement	• Annual forum • Peer exchanges • Website, publications and information databases • Linkages to other networks

To ensure the effectiveness of network activities, workshop participants agreed that the network must maintain a strategic focus that both targets country-specific needs and leverages regional experience. Emphasis in programming should be on developing and implementing innovative solutions that meet priority needs rather than creating a general networking platform with a broad mandate but limited capacity to ensure on-the-ground results.

Priority Program Areas

While priority program areas varied somewhat by country, participants identified the following priority areas for the network to target when developing projects and activities:

- Enforcement policies and authority;
- Institutional arrangements and decentralization;
- Compliance assurance (e.g., permitting and inspections);
- Self-monitoring, self-reporting, record-keeping;
- Public participation and economic instruments; and
- Indicators to evaluate agency performance.

These program areas correspond with common challenges identified in the country program assessments conducted in India, Philippines and Thailand.

Scope of Implementation

Participants confirmed that while network activities should focus primarily on improved implementation of domestic legal requirements, the network should also include activities that address transboundary pollution. In addition, the forum participants voiced the view that the network should not focus exclusively on urban and industrial environmental impacts, but, where practical, should include natural resources or coastal zone impacts and management.

Organizational Requirements

In discussions on establishing and operating an Asian practitioner network, participants identified four primary organizational requirements:

- Country membership,
- National coordinators,
- Executive committee, and
- Secretariat.

Country membership. Workshop participants recommended a membership structure where representatives from country environmental compliance and enforcement agencies would serve as the primary network members. While ministries would be official members, implementing departments could serve as the points of contact and program representatives.

Forum participants also voiced their support for involving other in-country stakeholders in network activities. Stakeholders could include related agency officials, judges, lawyers, civil society leaders and other experts.

National coordinators. The success of the network will depend on substantial commitments of time and resources by participating member countries, with differentiated responsibilities linked to available resources or level of program development. For countries where network partners will work closely to support formulation and development of new policies, practices and capabilities, participating member agencies should assign national coordinators to facilitate project and activity implementation.

Workshop participants also suggested that member countries should contribute not only to the development of their own programs and capabilities, but to those of counterparts. In particular, countries should host counterpart agencies through peer exchanges and transfer of information, as well as serve as mentors for particular program areas based on their comparative advantages and capabilities.

Executive committee. There was consensus on the need to establish an executive committee composed of country and donor representatives to guide the establishment and overall operations of the network. As a first task, an interim executive committee would be formed to develop the terms of reference for the network.

Once established, the network executive committee would oversee the development and implementation of annual work programs, as well as guide network sustainability. Members could serve on a rotating basis as set forth in the terms of reference.

Secretariat. To support implementation and coordination of network activities, participants agreed that the network should establish a secretariat. As with other networks, the secretariat would provide a central coordinating function between the executive committee, national coordinators, member countries and their stakeholders.

The secretariat would be responsible for working with partners to organize country and regional activities, support executive committee meetings, develop publications and tools, develop information management systems and track both network and country progress. The secretariat would also provide the focal point for coordination with other international and regional groups, including UNEP, ASEAN, APEC, SAARC, and other enforcement networks, such as INECE, REPIN, BERCEN and IMPEL.

Partner Commitments

Representatives from PCD, US-AEP, ADB and OECD made concluding remarks at the regional workshop, reaffirming their commitment to support the establishment of a regional environmental compliance and enforcement network.

Thailand Pollution Control Department

Dr. Supat Wangwongwatana, Deputy Director General

Workshop participants from seven Asian nations were unanimous in their support for establishing an Asian environmental compliance and enforcement network. Such consensus flowed naturally from two days of discussion on sharing international best practices and experience about environmental compliance and enforcement efforts, and on learning from the established networks of INECE, REPIN and BERCEN.

An Asian network will fill an important need in the region and enable counterpart environmental agencies and practitioners to exchange best practices and strengthen compliance and enforcement. To move forward, participants must maintain long-term commitment and formulate a sustainable work plan.

United States-Asia Environmental Partnership

Mr. Winston Bowman, Regional Coordinator

US-AEP is proud to support the establishment of a regional enforcement network dedicated to bringing together countries to share experiences and best practices for improving compliance and enforcement in Asia. Discussions on the network's organization and operations were very thoughtful and productive with the proposal to have national coordinators representing each country, an executive or steering committee guiding the network work plan development and a secretariat implementing and coordinating regional activities.

Recognizing different country levels of progress on environmental enforcement and compliance, US-AEP believes that developing country-specific indicators can be an effective means for addressing differences and sharing experiences. Finally, the issue of sustainability should be addressed from the very outset of establishing this network.

Representatives from USAID, Thailand PCD and ADB offer concluding remarks. From left: Mr. Winston Bowman, Regional Coordinator, US-AEP; Dr. Supat Wangwongwatana, Deputy Director General, Thailand's Pollution Control Department; Mr. Mark Kasman, Environmental Management Specialist, Asian Development Bank.

Asian Development Bank

Mr. Mark Kasman, Environmental Management Specialist

ADB commends the efforts of participants and commits future funds to support the establishment and development of the proposed regional network. This gathering of participants from seven Asian nations and the resulting consensus to establish an enforcement network signals significant progress to improve environmental conditions in the region.

Organisation for Economic Co-operation and Development

Ms. Angela Bularga and Mr. Eugene Mazur, Environment Directorate

Based on our experience in launching and operating a practitioner network in the countries in the EECCA, OECD commends the decision by participants to establish their own network in Asia to share experiences and ultimately develop improved environmental policies, institutions and capacity. OECD is interested in working closely with Asian environmental practitioners and linking the proposed network activities with planned and future OECD compliance and enforcement activities in Asia. As a first step, OECD looks forward to building on this momentum by inviting participants to join a workshop on water quality management instruments in Japan in December 2004.

Next Steps: Developing an Asian Network

As a next step, partner countries, donor agencies and networks will work together to begin implementation of the proposed action agenda, including establishing an interim executive committee to guide development of the network terms of reference, and support planning of a launching workshop in 2005 in Manila. The interim executive committee will invite new member countries and other donor partners to join the Asian Environmental Compliance and Enforcement Network (AECEN).

Participants discuss strategies for establishing an Asian network on environmental compliance and enforcement.

appendix 1 workshop agenda

Regional Workshop
Asian Environmental Compliance and Enforcement Forum:
Sharing International Experience on Environmental Compliance and Enforcement

Four Seasons Hotel, Pimarnman Room
Bangkok, Thailand
October 27-28, 2004

DAY 1: WEDNESDAY, OCTOBER 27, 2004

8:30 – 9:00 **Registration**

9:00 – 9:10 **Opening Remarks**

H.E. Mr. Petipong Pungbun Na Ayudhya
Permanent Secretary
Thailand Ministry of Natural Resource and Environment (MoNRE)

9:10 – 9:30 **Welcoming Remarks**

H.E. Mr. Darryl N. Johnson
United States Ambassador to Thailand

9:30 – 10:00 **Keynote: Importance of Environmental Enforcement and Regional Cooperation**

Hon. Mr. Justice Vijender Jain
Delhi High Court, India

10:00 – 10:30 Coffee Break

10:30 – 10:45 **Forum Objectives**

Dr. Supat Wangwongwatana
Deputy Director General
Thailand Pollution Control Department

10:45 – 12:00 **Regional Enforcement and Compliance Program Challenges**

Moderator: Ms. Jane Nishida, Senior Environmental Institutions Specialist
World Bank

Thailand: Dr. Supat Wangwongwatana, Deputy Director General
Pollution Control Department

Philippines: Mr. Luciano Hornilla, Regional Director
Department of Environment and Natural Resources, EMB Region 4-A

India: Dr. Dipankar Saha, Head, Agra Project Office
India Central Pollution Control Board

12:00 – 1:30 Lunch at Monthathip 1 Room (Ground Floor)

1:30 – 2:00 Guiding Principles of Reform of Enforcement Agencies

Mr. Eugene Mazur and Ms. Angela Bularga
Environment Directorate
Organisation for Economic Co-operation and Development (OECD)

2:00 – 3:30 **Panel 1: Permitting, Monitoring and Inspection Policies and Practices**

Moderator: Mr. Davis Jones, Environmental Scientist, U.S. EPA

Thailand: Development of New Self-Monitoring and Self-Reporting Regulations
Mr. Burachatr Akkaraporn, Environmental Inspector
Pollution Control Department

Philippines: Use of Inspection Checklists for Strengthening Compliance Monitoring and Enforcement
Mr. Virgilio Fabronero, Chief, Pollution Control Division
Department of Environment and Natural Resources, EMB Region 6

Discussion

3:30 – 3:45 Coffee Break

3:45 – 5:15 **Panel 2: Strengthening Institutional Arrangements and Decentralization**

Moderator: Ms. Angela Bularga, Environment Directorate, OECD

Sri Lanka: Regionalization of Central Environment Authority
Ms. Manel Jayamanna, Director General, Central Environmental Authority

China: Strengthening Provincial and Local Level Enforcement Capabilities
Mr. Chen Shanrong, Deputy Director General, State Environmental Protection Administration

Discussion

5:15 – 5:30 **Conclusion and Wrap-up**
Dr. Supat Wangwongwatana, Deputy Director General, Pollution Control Department

DAY 2: THURSDAY, OCTOBER 28, 2004

8:30 – 8:45 **Review of Day 1 and Overview for Day 2**

Mr. Winston Bowman, Regional Coordinator, US-AEP

8:45 – 10:15 **Panel 3: Enforcement Actions and Responses**

Moderator: Ms. Mamie Miller, Office of Enforcement and Compliance, U.S. EPA

Philippines: Strengthening Enforcement Response in Laguna de Bay
Mr. Ceazar Natividad, Laguna Lake Development Authority, Department of Environment and Natural Resources

India: Public Interest Litigation in India
Mr. Amarjit Singh Chandhiok, Sr. Vice President, Asia Pacific Jurist Association

Discussion

10:15 – 10:30 Coffee Break

10:30 – 12:00 **Panel 4: Promoting Compliance Through Economic Instruments and Incentive Based Approaches**

Moderator: Mr. Benoit LaPlante, Senior Environmental Economist, US-AEP

Indonesia: Promoting Compliance through Public Disclosure
Mrs. Hermien Roosita, Assistant Deputy, Ministry of Environment

Vietnam: Developing Vietnam's Pollution Charge System
Mrs. Nguyen Thi Kim Dzung, Ministry of Planning and Investment

Discussion

12:00 – 1:30 Lunch at Ratana-Kosin Room (Second Floor)

1:30 – 2:00 **Strategies for Developing National and Regional Indicators: Measuring Performance of Compliance and Enforcement Programs**

Mr. Kenneth Markowitz, INECE Secretariat
Ms. Mamie Miller, Office of Enforcement and Compliance, U.S. EPA

2:00 – 2:30 **Compliance and Enforcement Networks: Building Practitioner & Program Capacity**

Mr. Kenneth Markowitz, INECE Secretariat
Ms. Angela Bularga, Environment Directorate, OECD/REPIN Secretariat
Mr. Mihail Dimovski, Program Manager, BERCEN Secretariat

2:30 – 3:45 **Small Group Discussions: Strategies for Developing an Asian Compliance and Enforcement Network**

Facilitators: Mr. Kenneth Markowitz, INECE, and Mr. Mark Kasman, ADB
Mr. Eugene Mazur and Ms. Angela Bularga, OECD/REPIN
Mr. Mihail Dimovski, BERCEN, and Ms. Jane Nishida, WB
Mr. Davis Jones and Ms. Mamie Miller, U.S. EPA

3:45 – 4:00 Coffee Break

4:00 – 5:00 **Plenary Discussion: Report out Proposed Recommendations for an Asian Network**

Moderators: Mr. Paul Violette, US-AEP
Mr. Kenneth Markowitz, INECE

5:00 – 5:15 **Conclusion and Wrap-up**

Dr. Supat Wangwongwatana, Deputy Director General, Pollution Control Department

5:30 – 8:30 **Reception** at Ratana-Kosin Room (Second Floor)

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appendix 2

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REPORT

Regional Assessment Survey and Workshop on Full Cost Recovery for Water Utilities in Southeast Asia: *Sharing International Experience and Best Practices*

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SEAWUN

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REPORT

Regional Assessment Survey and Workshop on Full Cost Recovery for Water Utilities in Southeast Asia: *Sharing International Experience and Best Practices*

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ACRONYMS

ADB	Asian Development Bank
EPA	United States Environmental Protection Agency
FCR	Full Cost Recovery
IBT	Increasing Block Tariffs
IT	Information Technology
IGES	Institute of Global Environment and Society
KPI	Key Performance Indicators
NGO	Non-Government Organization
NRW	Non-Revenue Water
O&M	Operations and Maintenance
OECD	Organisation for Economic Co-operation and Development
SEAWUN	Southeast Asian Water Utilities Network
USAID	United States Agency for International Development
US-AEP	United States-Asia Environmental Partnership
WTP	Willingness to Pay
WFP	Water for People

Note: $ refers to US Dollars

summary

Providing access to clean, affordable water is a top global priority. Over 1.2 billion people worldwide lack access to safe water, more than half of whom live in Asia. World leaders at United Nations Millennium Summit in 2000 committed to the Millennium Development Goal 7, which aims to halve the proportion of people without access to safe drinking water and sanitation by 2015.

Given the pressures of rapid urbanization, meeting this challenge will require enormous infrastructure investment, as governments work to maintain aging water systems and expand services to peri-urban and rural areas. Devising financial strategies for covering the costs of these new investments poses a significant challenge. According to the United Nations Global Water Supply and Sanitation Assessment 2000 Report, funding limitations and inadequate cost recovery are major constraints to development.

Full cost recovery (FCR) occurs when a utility's revenues cover operational and other costs, and is an important indicator of the overall performance of a water utility. Financially strong utilities support efficient operations and provide good standards of service, which contribute to customer satisfaction, high willingness to pay and new investment opportunities.

Regional Full Cost Recovery Survey

Most water utilities in Asia are not achieving FCR due to low water tariffs, increasing operational costs, inadequate infrastructure development and weak management. To gain an improved understanding of FCR in Southeast Asia, the United States-Asia Environmental Partnership (US-AEP), a program of the United States Agency for International Development (USAID), in partnership with the Southeast Asian Water Utilities Network (SEAWUN), conducted an assessment of 15 water utilities in Indonesia, Malaysia, Philippines, Thailand and Vietnam, which had achieved or were close to achieving FCR.

Utility Performance Measures

Survey results provided key utility performance information, which revealed the following insights into their strategies for achieving cost recovery:

- Most surveyed utilities achieved FCR ratios (total costs/total revenues) below 1.00, which means that revenues from tariffs are sufficient to cover operations and maintenance (O&M) costs, as well as depreciation and capital (primarily debt service) costs.
- Larger utilities were more efficient in their staffing than smaller utilities.
- Non-revenue water ranged from 15 to 46 percent, and was also an important factor in performance. Utilities with less physical water losses tended to achieve higher cost recovery rates.
- All surveyed utilities except one had accounts receivable below the World Bank recommended level of 90 days.
- The lower the average number of days to collect receivables, the better the utility's FCR ratio.

Key Enabling Conditions

Participating utilities ranked, by order of importance, the enabling conditions (or "factors") that have contributed to their achievement of FCR. The top five ranked factors were: (1) maintaining effective working relationships with government; (2) building core staff capabilities; (3) offering customer-oriented services; (4) developing a business operations plan; and (5) maintaining accurate recordkeeping, accounting and information technology (IT) systems.

Key Utility Actions

Participating utilities ranked, by order of importance, specific actions that they undertook to improve cost recovery. The top five ranked actions were: (1) reducing physical losses or non-revenue water; (2) improving operational efficiency; (3) improving metering; (4) increasing tariffs; and (5) expanding the number of connections. Utilities also identified specific implementation strategies and tools employed in undertaking these actions.

Tariffs

One notable finding is that while utilities considered the tariff environment (as part of government relations) as the most important factor, they ranked tariff increases as fourth in terms of key utility actions to achieve cost recovery. This seemingly incongruous result reflects the reality that tariff adjustments are largely outside of the management control of most utilities. Moreover, this result highlights the difficulty utilities face in obtaining

tariff increases due to perceived, even if not actual, political pressure.

Regional Workshop on Full Cost Recovery and Affordability

To disseminate the findings of this FCR survey and develop a regional agenda for promoting cost recovery while maintaining pricing affordability, SEAWUN, US-AEP and the Organisation for Economic Co-operation and Development (OECD) co-organized a regional workshop on December 13–14, 2004 in Bangkok, Thailand. Hosted by Thailand's Provincial Waterworks Authority, the event attracted 60 participants, including senior water utility managers and experts from seven Southeast Asian nations, Europe and the United States. Other supporting partners included the Asian Development Bank (ADB) and Water for People (WFP).

Based on the survey findings, participating utilities and experts shared regional experience, explored strategies for improving the financial health of water utilities and set an action agenda for regional cooperation. International experts from the OECD also presented information and facilitated discussion on the social dimension of water affordability in the context of cost recovery.

Workshop presentations and discussions made clear that there is no one method or system that utilities can apply in their pursuit of cost recovery. Rather, each utility must develop its own multi-faceted approach that takes into account sector enabling conditions and employs new strategies that make best use of unique capabilities and

Regional Action Agenda for Promoting FCR

Priority Areas	Regional and Country Actions
Tariffs and Affordability **Objective:** Promote adoption of sustainable tariffs and adjustment policies that enable cost recovery while ensuring affordability	• Revise national tariff legislation to reflect FCR and improve institutions and procedures • Develop regional tariff guiding principles • Strengthen stakeholder awareness of critical linkage between tariffs and affordability • Promote development of model performance contracts between utilities and local governments • Conduct targeted studies and affordability analyses
Operational Efficiency **Objective:** Improve operational efficiency of utilities through adoption of innovative practices and cost-cutting methods	• Develop non-revenue water policies and programs • Develop regional guidelines on O&M best practices • Adopt best practices for reducing input costs, such as energy and chemicals • Adopt new employment practices • Adopt new asset management policies and procedures to optimize capital requirements • Establish certification and training programs to improve staff performance • Establish programs to create cost center/functional accounting systems
Leadership and Management **Objective:** Strengthen leadership and management practices of water utilities to improve overall financial performance	• Develop action plans on utility autonomy ("true corporatization") to facilitate adoption of new employment policies, hiring practices, salary scales, etc. • Establish staff and management incentives via performance measures, milestones and rewards • Develop operator certification and training programs to improve staffing capabilities, enhance transparency and provide incentives • Devise regional or provincial plans for achieving economies of scale

See Table 6 for the complete Regional Action Agenda

available resources. Survey results and case studies also confirmed that to affect change, utility managers must set clear priorities and then maintain discipline in implementing new plans and solutions, often in the face of political pressure.

As to water affordability, discussion centered on possible social policies and technical approaches that can help resolve the conflict inherent in promoting both the efficient use of water and equity in water pricing. Presenters observed that utilities should focus on improving the quality of service and raising customer awareness on the health benefits of clean water. Increasing block tariffs (IBTs) were viewed as important for increasing affordability for some users by cross-subsidizing rates and encouraging conservation behavior. By increasing operational efficiency and seeking tariffs that cover all capital and O&M costs, utilities would be able to expand coverage to better serve the unconnected poor.

Regional Full Cost Recovery Action Agenda

Workshop participants were unanimous in their support for regional exchange as a vital and useful strategy for utilities to improve operations, and ultimately expand the supply of clean water in the region. As a regional network, SEAWUN is well positioned to facilitate this exchange of best practices and information between utility managers and operators.

To support SEAWUN in its mission, workshop participants engaged in interactive small group discussions aimed at identifying key strategies and tools for promoting FCR in the region. Priority focus areas included: (1) tariff pricing and affordability; (2) operational efficiency; and (3) leadership and management.

For each focus area, workshop participants identified priority actions and possible implementation strategies and tools that could be employed at the regional or country levels, including lessons-learned workshops, specialized country or regional trainings, demonstration pilot projects, sustained utility-to-utility exchanges ("twinning"), publications and/or websites. Taken together, these findings serve as a regional action agenda to guide SEAWUN and other partner organizations, as well as individual utilities, in developing future regional and country FCR initiatives.

introduction

In partnership with the Southeast Asian Water Utilities Network (SEAWUN), the United States-Asia Environmental Partnership (US-AEP), a program of the United States Agency for International Development (USAID), conducted an assessment survey of 15 water utilities in Southeast Asia to identify key regional factors and actions that contributed to their achievement of full cost recovery (FCR).

The primary objectives of the survey were to:

- Gather and analyze key statistics and performance indicators on target utilities in the region; and
- Identify important enabling conditions ("factors") and key actions taken by utilities in achieving cost recovery.

Successful utilities from Indonesia, Malaysia, Philippines, Thailand and Vietnam participated in the survey with assistance from national water associations. Consultants for US-AEP analyzed the survey results and reported the findings.

As a next step, water utility managers and experts from Southeast Asia, Europe and the United States joined a regional workshop in Bangkok on December 13 and 14, 2004 to discuss survey findings and explore strategies for promoting FCR, utility efficiency and affordability for the poor in the region.

Organized by US-AEP, SEAWUN and the Organisation for Economic Co-operation and Development (OECD), and hosted by Thailand's Provincial Waterworks Authority (PWA), the workshop included 60 participants from national water associations and utilities in Cambodia, Indonesia, Laos, Malaysia, Philippines, Thailand and Vietnam, as well as regional financial and municipal water specialists. The Asian Development Bank (ADB) and Water for People (WFP) were also contributing partners.

The objectives of the workshop were to:

- Present regional survey findings on key performance indicators, enabling conditions and actions contributing to achievement of FCR, and identify key strategies for utilities to promote FCR;
- Address the social dimension of water affordability and willingness to pay in the context of FCR, and explore strategies for expanding access to water for the poor; and
- Develop a regional action agenda for cooperation between SEAWUN, member utilities and other partners to share best practices on achieving FCR, while considering affordability.

Report Outline

This report provides a summary of survey findings and workshop results in four parts:

1. **Background:** Provides context for the regional survey and workshop, including the importance of full cost recovery and linkage to water affordability.
2. **Survey Findings:** Provides a summary of the survey methodology and findings, including performance indicators, key FCR factors and actions and challenges and opportunities for utilities in the region.
3. **Regional Workshop Proceedings:** Presents highlights and outcomes of case study presentations and discussions on full cost recovery and affordability.
4. **Action Agenda:** Outlines the action agenda developed by participants for promoting improved cost recovery for water utilities in Asia as a primary means for strengthening access to clean water, especially for the poor. Priority areas include tariffs and affordability, operational efficiency and leadership and management of utilities.

Clean Water and Financing Challenges

Providing access to clean, affordable water is a top global priority. Over 1.2 billion people worldwide lack access to safe water, more than half of whom live in Asia. World leaders at United Nations Millennium Summit in 2000 committed to the Millennium Development Goal 7, which aims to halve the proportion of people without access to safe drinking water and sanitation by 2015.

Given the pressures of rapid urbanization, meeting this challenge will require enormous infrastructure investment, as governments work to maintain aging water systems and expand services to peri-urban and rural areas. Devising financial strategies for covering the costs of these new investments poses a significant challenge. According to the United Nations Global Water Supply and Sanitation Assessment 2000 Report, funding limitations and inadequate cost recovery are major constraints to development.

Full Cost Recovery

Full cost recovery for water services means covering all costs associated with operating, maintaining and financing a water system. In more technical terms, full cost recovery or FCR means that the revenues from water sales, primarily through tariffs, are equal to or exceed the amount required to cover all costs related to obtaining, processing and distributing water to the utility's customers. In other words, revenues cover not only operations and maintenance (O&M) costs, but also depreciation, taxes and cost of capital. *(For more detailed information, see Annex 5.)*

Full cost recovery is the principal indicator of financial health and overall performance of a water utility. Financially weak utilities often operate inefficiently, which can lead to high levels of non-revenue water, inadequate skills development, limited investment and poor service. Poor service, in terms of both water quality and quantity, can fuel customer dissatisfaction and low willingness to pay. As a result, utilities often have limited financial resources to maintain existing services and finance expansions. By contrast, financially strong utilities support efficient operations and provide good standards of service, which contribute to customer satisfaction, high willingness to pay and new investment.

"At least 1.2 billion people worldwide lack access to safe drinking water. Two million children die every year from infections related to water-borne diseases... the United States-Asia Environmental Partnership (US-AEP) is pleased to be working with water utilities in the region to share best practices to improve operational efficiencies and enable increased access to clean water, especially for the urban poor."

Mr. Timothy T. Beans, Mission Director,
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Achieving full cost recovery can be an important measure, therefore, of a utility's ability to improve and expand service. Financially stable utilities are able to promote rational consumption through pricing systems based on actual water use. Once equitable pricing is established, governments can reallocate subsidies to other public needs, such as education, health or transportation.

Difficulties in Achieving FCR in Asia

According to ADB, less that 30 percent of residents of most Asian cities enjoy 24-hour water supply. Low tariffs coupled with low service coverage have created great inequities, resulting in the poor paying far more than the rich. In Manila, for example, the ADB calculates that unconnected poor residents pay the equivalent of $20 per month for 6 cubic meters (m^3) of water, while connected residents pay $4 per month for 30 m^3 of water.

Full Cost Recovery
Revenue Requirement

RR = O&M + D + T + CC

RR = Revenue Requirement
O&M = Operations and Maintenance Costs
D = Depreciation
T = Taxes
CC = Cost of Capital (e.g., interest, return on equity)

Not surprisingly, most water utilities in Asia have difficulty achieving FCR due to a range of factors, including political pressure against water tariff increases, operational inefficiencies, poor infrastructure and mismanagement. For example, it is estimated that only five percent of Indonesia's 300 utilities are operating at full cost recovery levels and that 40 percent of utilities are unable even to recover their O&M costs. Trying to improve performance by focusing on a single area (e.g., tariff increase or reduction in non-revenue water (NRW)), however, can prove difficult because of inter-relationships between technical, financial and governance factors.

Nevertheless, some utilities in Asia are embracing new policies and methods that enable achievement of FCR. While improved water pricing strategies is one important mechanism for improved cost recovery, financial sustainability also depends on other factors, such as sound management, technical expertise, infrastructure coverage, balanced water consumption and production, low NRW, effective metering, recordkeeping, billing and collection practices and quality of service.

Southeast Asian Water Utilities Network

Headquartered in Hanoi, the Southeast Asian Water Utilities Network (http://www.seawun.org/) is a regional membership organization of water utilities and national water utility associations whose mission is to "help members improve their performance in the delivery of water supply and sanitation services, including improving efficiency in operation and management, achieving financial viability and advocating for reforms in the sector to improve the policy environment." As a regional network, SEAWUN provides a platform for members to exchange information, experience and know-how by participating in technical training, workshops and other activities in four core program areas: (1) full cost recovery; (2) benchmarking; (3) unaccounted-for-water; and (4) certification and training.

Ensuring Affordability of Water Services for the Poor

Raising tariffs can be an effective strategy for utilities to meet rising costs of infrastructure and operations, but also can have significant impacts on low-income populations in Asia. To address these social concerns in the context of full cost recovery, governments can adopt affordability measures in tandem with new water tariff structures that reflect the true costs of operations. In many Asian cities, however, the poor are unconnected to water supplies and pay much higher prices than those who are connected. In these situations, tariff increases could actually enable utilities to expand services to the poor.

In cases where raising tariffs will result in unaffordable prices (a threshold of five percent of household income is commonly used), then the following measures should be considered: using increasing block tariffs (IBTs), applying cross-subsidization between different consumer groups, providing targeted assistance for the poorest populations, avoiding high one-time connection fees and reducing value-added tax.

At the regional workshop, experts from Europe and Asia, in partnership with OECD, shared experiences on social affordability policies that protect disadvantaged populations, and at the same time ensure full cost recovery. *(See Part 3 for further information on affordability strategies and case studies.)*

full cost recovery survey findings

Survey Background and Methodology

In cooperation with national water utility associations and SEAWUN, US-AEP conducted a survey of 15 successful water utilities in Indonesia, Malaysia, Philippines, Thailand and Vietnam that achieved or were close to achieving full cost recovery *(see list of participating utilities in Table 1 and survey form in Annex 10)*.

The primary objectives of this survey were to:

1. Gather and analyze key statistics and performance indicators on target utilities in the region; and
2. Identify important enabling conditions ("factors") and key actions taken by utilities in achieving cost recovery.

Local coordinators from the national water associations and US-AEP selected participating utilities based on their progress towards achieving FCR. In technical terms, this meant that the utilities had realized an O&M ratio of less than one (O&M costs/revenues), and an FCR ratio of less than or close to one (O&M, depreciation, taxes, interest/revenues). Some associations applied additional criteria, including size, geographic representation and legal structure of the utility (e.g., government departments, government-owned corporations or private corporations).

By completing a survey questionnaire and participating in direct interviews, utilities provided financial statistics, which allowed calculation of key performance indicators. Utilities also identified key factors and actions that contributed to their achievement of full cost recovery, as well as narrative information.

- **Utility Performance** – Core statistical information providing insights into operational performance and implications for FCR include: (1) O&M and FCR ratios; (2) staffing efficiencies; (3) non-revenue water; (4) service coverage; and (5) accounts receivable collection period.

- **Factors** – Enabling conditions that allowed utilities to take key actions include relationships with local government/regulator, quality of management, training programs, regulatory environment, customer orientation, customer/ratepayer education, civil society oversight and management tools, such as accounting systems, IT, business plans and capital planning.

- **Actions** – Specific activities or interventions by utilities are those that led to a reduction in costs (e.g., energy, chemicals and labor) and/or an increase in revenues (e.g., tariff increases, improved billing and metering, reduction in non-revenue water, more customers).

US-AEP aggregated findings and completed a sectoral, country and regional analysis, based in part on discussions with utility managers and representatives from national utility associations. *(See Annex 6 for an overview of survey results, and Annex 1 for additional survey information)*.

Survey Findings

To understand utility performance and enable comparison between countries and individual utilities, the survey captured key statistical information and performance indicators, including: (1) population served; (2) number of connections; (3) production capacity; (4) actual production; (5) percent of water fully treated; (6) O&M ratio; (7) FCR ratio; (8) legal status; (9) production costs; (10) average sale price; (11) non-revenue water; (12) accounts receivable collection period; and (13) number of staff per 1,000 connections *(see Table 1)*.

In reviewing Table 1 and other survey information, it is clear that the financial performance of a utility cannot be attributed to one single factor (e.g., higher rates); rather, it is the result of various policies and actions.

Government Roles and Tariff Policies

Survey results revealed that responsibility for managing water supply services varies by country. In Indonesia and the Philippines, authority rests with municipalities, while in Malaysia and Vietnam, water supply is a state or provincial function. However, new developments are on the horizon in Malaysia that will shift key water supply functions from the state to the federal government and will establish an independent regulatory body. In Thailand, the national government assumes responsibility

Table 1 : Key Statistics and Performance Indicators of Surveyed Utilities

Utility	Pop Served %	No Conn	Prod Cap (m3/day)	Act Prod (m3/day)	Rcves Full Trmnt %	O&M Ratio	FCR Ratio	Legal Status **	Prod Cost ($/m3)	Avg Sale Price ($/m3)	NRW %	Acct Rcvble Days	# Staff / 1000 Conn
Indonesia													
Bogor	65	66,598	35,667	40,767	70	0.70	0.96	1	0.15	0.18	30.7	38	6.5
Makassar***	72	121,128	202,176	192,432	100	0.82	1.21	1	0.09	0.25	46.2	99	6.0
Malang	67	80,382	1,255	1,514	0	0.77	0.80	1	0.11	0.21	33.4	49	7.0
Medan	88	329,660	416,189	414,633	79	0.88	0.97	1	0.14	0.17	20.3	52	3.3
Malaysia													
Johor	99.7	773,256	1,436,000	1,291,000	100	0.49	0.90	3	0.06	0.22	37.5	30	2.2
Penang	99.9	402,777	1,166,000	759,000	100	0.63	0.80	2	0.05	0.17	20.0	49	2.7
Sibu	96	44,665	130,000	87,000	100	0.82	1.08	1	0.24	0.21	28.0	56	4.6
Philippines													
Dipolog	35	7,056	8,497	6,586	53	0.64	0.82	2	0.08	0.38	23.9	38	5.3
Marilao	50	8,870	14,202	9,291	0	0.63	0.72	2	0.14	0.40	18.5	28	5.0
Leyte	44	25,004	33,091	29,746	99	0.70	0.95	2	0.12	0.32	29.5	51	6.5
Thailand													
MWA***	82.5	1,540,203		4,153,425	100	0.32	0.64	4	0.23	0.29	30.0	31	3.0
PWA	72	1,931,678	2,873,088	2,131,586	100	0.33	1.04	4	0.22	0.29	26.0	14	3.0
Vietnam**													
Hai Phong	85	140,176	176,000	122,000	100	0.56	1.15	2	0.11	0.18	28.0	10	10.1
Thua Thien-Hue	91.5	54,467	99,100	56,877	100	0.56	1.00	2	0.11	0.15	20.0	2	5.8
Ba Ria - Vung Tau	70	63,413	82,200	85,764	100	0.57	1.21	2	0.14	0.16	15.0	6	5.7
WB Recommendations*						0.68					23.0	90	5.0

Notes:

* Based on the top 25 percent of best performing utilities in developing countries

** Legal Status - 1 Department, 2 Government Corp/Enterprise, 3 Private Sector, 4 Government & PPPs

*** Ratios based on financial statements

**** Includes contributions to various funds out of profits in the FCR ratio

through the Metropolitan Waterworks Authority (MWA) (greater Bangkok), and the Provincial Waterworks Authority (PWA) (all other provinces).

The degree of government support for capital expenditures also varies by country. For utilities in the Philippines, MWA in Thailand and Johore in Malaysia, there is no government support. By contrast, all utilities in Indonesia and Vietnam, and PWA in Thailand enjoy partial government support. Malaysia also provides significant financial backing to all utilities except privatized ones.

As for tariffs, which are central to achieving FCR, adjustments have political implications, and are achieved with some difficultly in all surveyed countries except the Philippines *(see Table 2)*. For example, in Indonesia, it is not uncommon for tariff increase approvals by the local government to occur once every five to six years. In places like Malaysia, although a small number of providers have increased tariffs in the last two or three years, more than half of providers have not received tariff increases in 10 to 20 years.

By contrast, water utilities in the Philippines are able to secure sufficient tariff increases to cover their true operations and maintenance costs. Responsibility for tariff setting and technical assistance rests with the Local Water Utility Administration (LWUA), a national, technical organization. Subject to less political pressure, LWUA typically adheres to its tariff policy, which advocates for rates to reflect the full cost of service delivery.

To further assist utilities, Philippine national policy allows water utilities to increase rates by up to 60 percent, and to approve two- or three-step incremental increases in one review process. An example of such a rate increase implementation program can be seen in the Metro Leyte utility, where rates increased by over 50 percent for each non-wholesale customer type between May 2003 and December 2004. Ultimately, tariff adjustments must be balanced with affordability considerations so that rates do not exceed the recommended Philippine affordability criterion of five percent of household income.

Cost recovery may soon accelerate in Vietnam as a result of a recent government directive requiring all provincial water supply companies to set tariffs based on the full and accurate inclusion of all operations and maintenance costs, depreciation, debt payment and return on investment. *(For more detailed country-specific information, see presentations in Annex 6 and additional survey information in Annex 1).*

Table 2: FCR Policies and Tariff Adjustments

Country	National Policy on Cost Recovery	Tariff Adjustments
Indonesia	Yes	Difficult; Increase only every 5-6 years
Malaysia	No	Difficult; 50 percent of utilities with no increase in 10-20 years
Philippines	Yes	Not difficult; national, technical agency implements tarrif increases
Thailand	No	Difficult
Vietnam	Yes	Previously difficult

Vietnam Issues National Directive on Cost Recovery

In 2004 the Vietnamese national government issued a Directive 04/2004 requiring all water supply companies to set tariffs based on the full and accurate inclusion of all operations and maintenance costs, depreciation, debt payment and return on investment. This directive also mandates tariff pricing to cover new investments.

Two water supply companies have already adjusted their tariffs to comply with the directive and it is anticipated that other utilities will adjust their tariffs by early 2005. The Vietnamese Water Supply and Sewerage Association is confident that all companies will be able implement this policy by the target date. Overall, Vietnam's new directive sets an important precedent for the region.

Analysis of Utility Performance

In assessing the financial performance of successful utilities in the region, it is clear that various policies and actions contribute to the financial success and performance of utilities. Key performance indicators that measure the financial health of a utility include: (1) O&M and FCR ratios; (2) staffing efficiencies; (3) non-revenue water; (4) service coverage; and (5) accounts receivable collection period.

O&M and FCR Ratios

- All surveyed utilities had O&M ratios less than one, which means that the revenues from tariffs cover operations and maintenance costs *(see Figure 1)*.
- Over half of the surveyed utilities have an O&M ratio below 0.68, which is the World Bank recommended O&M ratio based on the top performing utilities in developing countries.

- The majority of surveyed utilities also achieved FCR ratios just below 1.00, which means that the revenues from tariffs are sufficient to cover O&M costs, as well as depreciation and debt service costs. However, for most of the utilities to expand coverage, tariffs will need to be further increased to cover the additional debt service costs related to outside financing and/or the respective governments will need to inject capital.

Staffing Efficiencies

- The survey confirmed common knowledge: larger utilities are more efficient in their staffing than smaller utilities, as measured by the number of staff per 1000 connections or number of connections per staff.
- Improving staffing efficiency is a critical goal, since labor can constitute over 30 percent of operational costs *(see Figure 2)*.

Non-Revenue Water

- Non-revenue water (NRW), which ranges from a low of 15 percent in Ba Ria Vung Tau, Vietnam, to a high of 46 percent in Makassar, Indonesia, is also an important performance factor. Utilities with low physical water losses typically achieve higher levels of cost recovery.
- Reducing NRW is especially important for utilities that use full production capacity, since improvements can offset some capital projects in the short term. This can be seen in Ba Ria Vung Tau where NRW is the lowest (15 percent), while the actual production exceeds production capacity by 4 percent.
- NRW is also especially important for utilities with a lower service coverage level (percent of population served) since any water lost could service new customers. This improvement strategy is relevant for many of the utilities, including Bogor, Makassar, Malang and Leyte, whose NRW substantially exceeds the 23 percent level recommended by the World Bank.

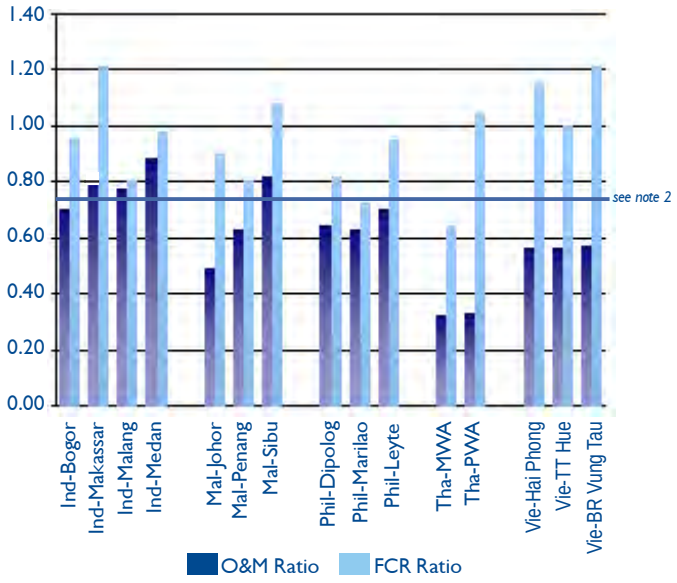
Service Coverage

- Average service coverage in the five countries (not among the surveyed utilities) ranges between 35 and 70 percent, except for Malaysia, which nearly has universal coverage.
- The level of population served in the region, aside from Malaysia, is still low even among stronger utilities. This is especially true in the Philippines and to a lesser extent in Indonesia.

Accounts Receivable

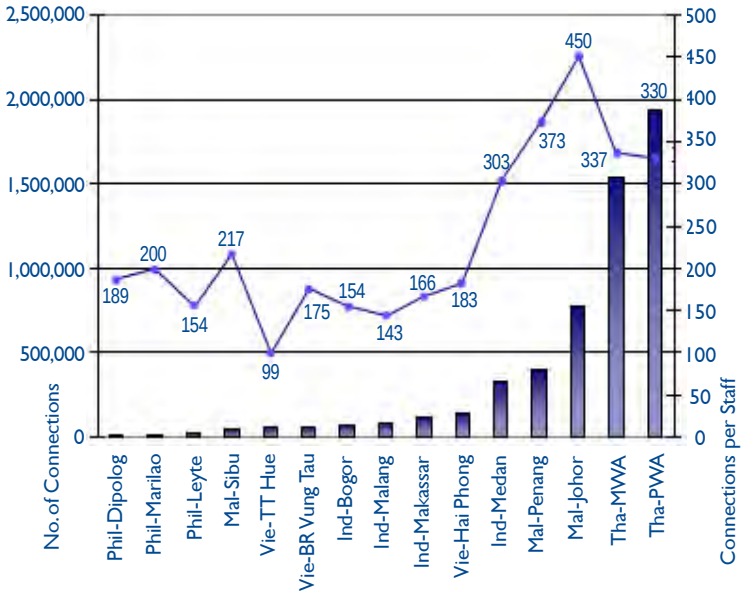
- All surveyed utilities except one have accounts receivable below the World Bank recommended level of 90 days.
- Survey analysis also revealed the lower the average number of days to collect receivables, the closer the utility is to achieving FCR. Although this collection ratio alone does not translate into a stronger company financially, it does reflect on the quality of management. Policies and actions that lead to a stronger collection rate include better accounting, metering, meter reading and billing and collection procedures.

Figure 1 : O&M Coverage vs. FCR Coverage



Note:
1. As the Vietnamese utilities contribute profits to various funds, their FCR ratios may understate their success.
2. World Bank recommended O&M ratio of 0.68 based on top performing utilities in developing countries

Figure 2 : Relationship Between Size of Utility and Staffing Efficiency



Key Factors for Improving Cost Recovery

As part of the survey, utilities ranked in order of importance five key enabling conditions, or "factors," that had a positive impact on efforts to improve cost recovery. According to the surveyed utilities, these factors provided the basis for decision-making on specific courses of action that enabled them to achieve FCR.

As indicated in Table 3, utilities ranked the tariff environment (as part of government relations) as the most important factor, a finding that is consistent with a conclusion made in ADB's Asian Water Supplies book (2004): *"It is the reluctance of elected officials to increase tariffs that has, more than any other single factor, constrained water supply development in terms of quality of service and coverage."*

Government Relations (local or central)

- Utilities selected their relationship with government as the most important factor, based primarily on the difficulties they face in obtaining tariff increases. For utilities where local governments also fund capital expenditures, this relationship becomes even more important.
- Most surveyed utilities cited regular reporting and meetings as a principal means for improving the relationship. One utility that proactively informed the local government of its excessive staffing ratio did not receive objections later when it announced plans to retrench staff.

Attitudes and Professional Background of Personnel

- Not surprisingly, surveyed utilities selected this as the second most important factor, since the success of an organization is widely known to depend on its management (leadership) and human resources.
- Vietnam placed so much importance on leadership that they classified FCR factors into two groups: leadership and "everything else."
- Some utilities cited the importance of the attitudes and professional background of board members and local government staff for effective communication.

Table 3: Key Factors for Improving Cost Recovery

Ranking	Key Factors	Relative Importance
1	Government relations (local or central)	20%
2	Attitudes and professional background of personnel	16%
3	Customer-oriented service	13%
4	Existence of a medium-term business plan	8%
5	Accuracy of recordkeeping, accounting and IT	7%
6	Development of a benchmarking / KPI system	7%

Customer-oriented Service

- Surveyed utilities recognized that good service builds a company's reputation, which helps attract new customers while minimizing customer and governmental objections when tariffs need adjustments.
- Utility efforts to improve customer service included establishing a call center and an available rapid response team to address time-sensitive issues like pipe bursts or leaks.
- Some utilities, like Medan, also used third-party billers to obtain customer feedback while conducting door-to-door billing. This strategy is an easy and effective way to understand customer needs rather than only receiving feedback from customer complaints.
- Hai Phong's commitment to its customers was reflected in its internal regulations, which require each division to develop and implement a customer service plan, as well as prepare quarterly and yearly customer development reports.

Medium-term Planning

- Planning is essential for utilities to identify priority projects and timeframes for implementation.
- PWA described the business plan as the compass of the organization, providing it with a vision, mission, objective, indicators and projects for each year.
- Johor's plan laid out the direction of its business using key performance indicators (KPIs), which provided a method for agreeing on future cost and revenue drivers and supporting eventual tariff increases.
- Sibu's experience underlined the importance of the utility and local government jointly reviewing and agreeing on the utility vision, mission and action plans on a periodic basis.

Accuracy of Recordkeeping, Accounting and IT

- This factor is also deemed critical to achieving FCR as it relates to metering, meter reading and billing and collection.
- Accurate data allows management to identify problems and make sound decisions. Through better computer-based recordkeeping and accounting, the utility can better understand, monitor and manage cost and revenue centers.

Key Actions for Improving Cost Recovery

As part of the survey, utilities ranked in order of importance specific priority actions that they took to improve cost recovery *(see Table 4)*. Top actions identified by utilities were not surprising and reflect routine actions generally taken by utilities to improve financial performance.

One notable finding is that while utilities considered the tariff environment (as part of government relations) as the most important factor, they ranked tariff increases as fourth in terms of key utility actions to achieve cost recovery. This seemingly incongruous result reflects the reality that tariff adjustments are largely outside of the management control of most utilities. Moreover, this result highlights the difficulty utilities face in obtaining tariff increases due to perceived, even if not actual, political pressure.

To a lesser extent, this ranking could also reflect the limited importance that the utilities themselves place on tariff increases. Interviews with several utilities further supported this view. In fact, some utilities seemed to be opposed to increasing tariffs and believed that tariff increases somehow violated their public service mandate. Instead, they would rather supplement the revenue shortfall by applying for government grants. Oddly, these same utilities favored full cost recovery. These conflicting attitudes about tariff increases may account for the high degree of innovation and creativity of specific utility actions and implementation strategies across the region *(see Table 5, page 14)*.

Illustrative examples include the following:

- In Indonesia, the Medan utility took steps to reduce NRW by carefully monitoring unusually high consumption patterns of large customers on a monthly basis.
- In Vietnam and the Philippines, several surveyed utilities adopted strict disconnection policies for non-payment and strict penalties for water theft.
- In Thailand, both MWA and PWA reduced labor costs and increased staff efficiency through early retirement policies. Moreover, both water authorities improved operational efficiency by annually measuring performance using the government's KPIs.
- The Penang Water Supply Corporation in Malaysia and the Ba Ria Vung Tau utility in Vietnam improved operational efficiency by requiring the use of high quality pipes and meters for all new connections and carefully supervising such installations.

Table 4: Key Actions for Improving Cost Recovery

Ranking	Key Actions	Relative Importance
1	Reduction in physical losses	22%
2	Improvements in operational efficiency (reducing power, labor, chemical costs)	19%
3	Improvement in metering (reading, replacement, repair)	17%
4	Tariff increase	12%
5	Aggresive increase in the number of connections	12%
6	Improvement in billing (invoicing, collection, payment methods)	9%

Principal Challenges to Achieving FCR

Although utilities targeted in this survey have achieved cost recovery by devising innovative strategies and interventions, most utilities in Southeast Asia are far from attaining financial sustainability. Based on survey analysis and discussions with national water associations, utility managers and experts, it is clear that most utilities in the region face significant challenges related to tariff setting, human and institutional capacity, infrastructure development and financing. *(For more detailed information, see presentation in Annex 5.)*

Principal challenges to achieving FCR include:

Revenues/Tariffs

- Most utilities in the region have insufficient revenue to cover O&M costs and capital costs.
- With insufficient revenues, utilities lack incentives to extend coverage to the poor, promote water conservation, reduce NRW and properly manage meters and infrastructure.

Personnel

- Low salaries, benefits and professional advancement opportunities prevent many utilities from attracting quality managers and technicians.
- Government employment policies often result in overstaffing at utilities.

Operations and Maintenance

- Many utilities in the region make inefficient use of energy/fuel, lubricants and chemicals.
- For cash-strapped utilities, maintenance is a low priority, which can reduce the life of the asset. Poor maintenance often results in pipe leakages and high NRW.

Capital Expenditure (Depreciation)

- Many utilities struggle to establish financial autonomy and prioritize capital projects.
- Utilities often do not consider inflation versus replacement costs for their operations and do not properly analyze the depreciation costs of an asset against the principal still due on their outstanding debt.

Cost of Capital

- Financially-strained utilities typically secure high interest loans and can only borrow funds if the government or some other institution guarantees the debt.
- Utilities do not pass rising costs associated with variable interest rates on to customers.

General and Administrative

- Many utilities lack important internal controls, such as operating policies and procedures, as well as timely, accurate and transparent billing and accounts receivable records.
- Mismanagement of meter installation, maintenance, reading and billing and collection also contribute to inefficient operations.

Government Relations

- Many government offices do not fully understand the importance of FCR and how financially stable utilities can simultaneously increase service quality, extend coverage to the poor and promote customer satisfaction.
- With a better understanding of the benefits of FCR, governments are more likely to adopt, implement and enforce rationally-based and fair water pricing tariff legislation.

Customer Relations

- Users in the region too often assume quality water and wastewater services should be free or low-cost. Educating customers about the true costs of operating and maintaining quality water services is crucial for promoting FCR.
- Paying customers must understand that they are subsidizing illegal connections. Artificially low water bills may, in fact, serve as a disincentive for customers to pay, since they reinforce the notion that water services are low-cost commodities.

Preliminary Considerations

Based on the survey findings and analysis, the following preliminary considerations were developed for promoting FCR through improved policy measures and capacity-building. Although these considerations were prepared specifically for discussion at the regional workshop organized by US-AEP, SEAWUN and OECD on December 13-14, 2004, they may be useful more generally for national and local governments, and utilities operating in the region.

National Level

1. Adopt a National FCR Policy: Countries should consider adopting full cost recovery policies that address issues of affordability and extend access to the poor. Any adopted policy should include a reasonably detailed outline of costs to consider, including depreciation and cost of funding, when determining the revenues required to achieve FCR. Utilities should not follow these policies rigidly, since affordability concerns should be addressed in tariff setting (cross-subsidization), or if absolutely necessary, through specific government subsidization of connecting and possibly providing water to target lower income customers.

2. Establish an Independent Regulatory Body: Given the difficulties many surveyed utilities face in obtaining tariff adjustments, an entity that is not subject to political pressure should be responsible for completing tariff reviews and adjustments. This entity should (1) provide the necessary expertise and authority to evaluate a utility's financial performance, and (2) work to protect consumer interests and needs.

Local Government Level

3. Develop Quantitative Performance Targets: Regardless of whether or not a regulatory body is established, local governments should consider developing quantitative performance targets to evaluate utility performance. Performance indicators and ultimate targets should be realistic, achievable and understandable to all parties involved. Initially, since efficiency data on utility performance is limited, local governments could negotiate the indicators and targets with utilities and measure performance on a periodic basis (e.g., year-to-year). Over the longer term, the performance indicators could also be used to compare performance with other utilities.

   Existing data, such as financial statements, could provide initial benchmarking information necesary for setting performance indicators. Utilities that achieve these performance indicators, in turn, should be rewarded with more autonomy, including offering bonuses for management and employees. Thailand's experience has demonstrated that KPIs

Table 5: Specific Utility Implementation Strategies for Key Actions

Key Actions	Utility Implementation Strategies
Reduction in physical and other losses	• Hold scheduled checks and inspections of pipelines, provide rapid response to repair leaks and analyze water loss for preventive and corrective action (Sibu NRW team). • Implement a four-year NRW reduction project (PWA). • Use high quality pipes and carefully supervise installation (Ba Ria Vung Tau). • Install high quality pipes and develop a procedure for enforcement and control through Material Approving Technical Committee (Penang). • Minimize water theft through night shift inspection and application of a strict penalty per Water Crisis Act (Leyte and Marilao). • Train community members as plumbers to repair in-house connections, which in turn provides new employment opportunities (Leyte). • Request communities to report leakages (Leyte, Sibu). • Conduct monthly spot checks on internal plumbing system for early leakage detection (Sibu). • Make manual pressure adjustments on entire network using upstream system pressure relief valves and downstream booster pumps (Ba Ria Vung Tau).
Reduction of costs and improvements in operational effficiency	• Reduce personnel cost through hiring freeze and voluntary early retirement of highly paid senior staff (PWA). • Reduce power costs by scheduling to avoid peak hour rates and, where appropriate, switch to time-of-use power meters (PWA). • Adopt electricity-saving campaigns and reduce manpower per shift in pump operation (Sibu). • Use cheaper chemicals (Sibu) or identify optimal chemical doses with 'jar tests' (Makassar, PWA). • Adhere strictly to budgeted costs and expenditures, except in emergency situations for pipe repairs (Malang, Bogor). • Monitor monthly costs at all cost centers, which are established based on service areas (Hai Phong). • Encourage utility employees to develop creative methods for increasing efficiency (several surveyed utilities).
Improvements in metering	• Meter and bill all supplies, except public hydrants (most surveyed utilities). • Replace meters automatically after five to eight years of service (many surveyed utilities). • Adopt a policy on testing meter performance before installation (Penang). • Replace slow and non-registering meters immediately (Sibu). • Impose stiff penalties on meter readers who fail to read the meter correctly (PWA). • Outsource meter reading to third parties (Makassar and PWA). • Install water meter protectors to reduce tampering (Marilao). • Centralize meters by grouping between two and ten water meters in one location. This strategy simplifies meter installation, maintenance and reading (Dipolog).

Key Actions	Utility Implementation Strategies
Tariff increase	• Initiate public awareness campaigns/hearings/education. Public education includes visits to water treatment plants to provide the public with an appreciation of the costs of treating and transporting water (most surveyed utilities). • Consider the timing of a proposed tariff increase to avoid elections (most surveyed utilities). • Propose legislation allowing the utilities to achieve FCR (several surveyed utilities). • Propose legislation authorizing increases in rates (Philippine utilities). • Contract with experienced NGOs to disseminate tariff increase plans to the poorer segments of the public to raise awareness and minimize public opposition (Makassar). • Conduct customer satisfaction surveys prior to tariff increases to identify whether consumers are satisfied with service and will support an increase (Bogor). • Involve unserved populations to advocate tariff increases as they are likely to benefit from expanded services funded by new tariffs (Makassar). • Propose minimal increases for poorer customers to make tariff increases more acceptable to politicians (Medan). • Stagger increases that are approved in one tariff review (Philippine utilities).
Increase in number of connections	• Focus on large consumers such as industrial and large businesses (PWA). • Target populations in areas where there is a ban on groundwater abstraction due to land subsidence, and in areas where there is a water surplus to offer reduced connection fees and water tariff discounts (PWA). • Offer quick installation process for new customers (Medan). • Allow customers to pay for new connection fees on credit (Medan). • Implement campaign programs in unserved areas (many surveyed utilities).
Billing and collection practices	• Use joint collection agencies and multiple payment points (most surveyed utilities). • Review customer classification during field inspection and modification if appropriate (Makassar). • Offer discounts to customers who pay bills on time (Makassar). • Apply initial clamping using lockable clamps as first warning, followed by removal of meter if bills are not paid (Penang). • Enforce disconnection policy strictly (Vietnam and Penang). • Reduce disconnection period from two months to one month (Marilao). • Offer door-to-door billing by third parties who can also solicit feedback from customers about the utility's service (Medan).

can be useful in encouraging utilities to improve their performance. Similarly, the experiences of Medan and Hai Phong also demonstrate that linking the utilities' performance with management incentives can improve overall performance.

Utility Level

4. Tariff Review Measures: When applying for a tariff review approved by local governments, utilities should address the concerns of both local governments and the public. The list below provides an illustrative menu of options for utilities to consider:

- *Advocate Affordability and Tariff Increase Issues Together:* Address issues of affordability in proposing the tariff increases. This strategy will address a primary concern of governments and councilors in granting a tariff increase.

- *Analyze Unserved Population Rates:* Consider conducting a survey on how much the unserved population has to pay for water. In areas where alternative sources of water are not available, the unserved often have to buy water from vendors and pay from 7 to 35 times more per cubic meter than those served with piped water. Arguably, if tariffs are increased, the utility will have the ability to expand service to the unserved. When resources are not available to conduct a survey, the utility may be able to rely on results from surveys conducted in other similarly-situated towns.

- *Examine Other Arguments to Support FCR Tariffs:* Highlight backlogs in service delivery and the government's inability to fund the backlog, and explain how a tariff increase could address these financial shortcomings. While backlogs in service delivery can be construed as a weakness, it could also strengthen the argument for FCR tariffs.

- *Express Tariff Increases in Easily Understandable Terms:* Express the implication of the tariff increase in the usual terms (e.g., 20 percent increase, or 30 cents/cubic meter), as well as in new terms, such as cost per liter or kiloliter.

5. Maintain Regular Communication with Local Government: Utilities should consider maintaining regular communication, written and/or verbal, with local governments on the status of water supply service and potential problems. When reporting financial information, for example, utilities must address concepts of depreciation and its importance in repayment of principal on loans, and the funding of additional capital projects from internally generated funds (e.g., asset replacement).

6. Emphasize Strong Leadership and Management: Based on the survey findings, successful utilities depend on strong management and leadership (attitudes and professional background), which in turn require competitive recruitment, commensurate salaries and incentives (career path and planning incentive pay schedule). To increase the pool of qualified candidates, successful utilities should consider recruiting water utility managers from both inside and outside their organizations. Such recruitment strategies tend to make the profession of water utility managers more attractive, since career advancement is not limited to promotion within a particular utility.

7. Develop Customer-Oriented Services: Utilities should consider emphasizing customer-oriented service strategies based on the survey results listed in Table 5.

8. Establish a Medium-Term Business Plan: Successful utilities typically gauge their financial viability and improvement by developing and following a medium-term business plan. To stay on track with the business plan, utilities should consider relying on accurate recordkeeping, accounting and IT, as well as careful analysis of capital investment. Including the ratemaking authorities in the business plan process will emphasize the importance of achieving FCR and may facilitate an increase in rates.

9. Adopt Cost-Cutting Measures: To reduce costs, utilities should consider implementing strategies such as those identified in Table 5.

10. Adopt Procedures to Promote Transparency: Transparent and independently verifiable information is critical to all stakeholders. For employees, this issue becomes even more important as the utilities adopt incentives. For investors, this (audited) information will reduce uncertainty and therefore the cost of financing and encourage increased investment. For ratepayers (customers), transparency and reliable information will facilitate efforts to increase tariffs to levels that are required to achieve FCR. For governments/regulators, accurate information provides a clear method for determining proper rates. It is critical that the parties responsible for taking the steps to attain transparency and independently verifiable information do not fear negative consequences in the short term.

regional workshop proceedings

Regional Workshop on Full Cost Recovery and Water Affordability

To disseminate the findings of this FCR survey and develop a regional agenda for promoting cost recovery while maintaining pricing affordability, SEAWUN, US-AEP and OECD co-organized a regional workshop on December 13–14, 2004 in Bangkok, Thailand *(see Annex 2 for workshop agenda)*. Hosted by Thailand's Provincial Waterworks Authority, the event attracted 60 participants, including senior water utility managers and experts from seven Southeast Asian nations, Europe and the United States. Other supporting partners included ADB and Water for People.

During the workshop, participating utilities and experts shared regional experience, explored strategies for improving the financial health of water utilities and set an action agenda for regional cooperation. International experts also presented information and facilitated discussion on the social dimension of water affordability in the context of cost recovery.

What follows is a summary of featured case studies on strategies for achieving full cost recovery while addressing affordability.

Strategies for Improved Policies and Institutional Arrangements

A utility's ability to achieve cost recovery can depend in part on effective policies and institutional arrangements. Appropriate tariff adjustment policies can yield significant results by allowing utilities to cover not only operations and maintenance costs, but also depreciation interest payments and a return on equity for private sector utilities.

Achieving such tariff adjustments, however, requires utilities to build strong relationships with government authorities. Improving institutional arrangements also can have an important impact on increasing cost recovery. Presentations from Indonesia, Cambodia and the United States illustrated the effects specific tariff policies and institutional arrangements can have on utilities' ability to achieve cost recovery *(see case study presentations in Annex 7)*.

INDONESIA

Optimizing Tariffs through Effective Relationships with Local Government

Mr. Subahri Ritonga, Administration & Finance Director, Medan Water Utility

To secure a much needed tariff increase, the Medan Water Utility recognized that it needed to develop strong relations with and garner support from both the local authorities and local community through negotiations and awareness raising campaigns. Recognizing the political challenges associated with tariff increases, the utility first offered to provide the government free water service for places of worship and public facilities in the community.

The utility also employed creative tariff restructuring by maintaining the tariff per unit for low-income users, while reducing the size of the consumption block. These changes allowed low-income users who maintained a consumption at or below basic needs (10 m^3 per month) to enjoy the same tariffs, while those who consumed above that amount paid higher tariffs.

To raise awareness in the community and minimize public opposition to the proposed rate increase, the utility invited customer representatives to tour the water processing facility and learn about the costs associated with operating the water supply system. The utility also offered seminars on water conservation and efficiency. In the end, due to strategic negotiations with the government and its public awareness campaigns, the Medan Water Utility was able to obtain a justified and reasonable tariff increase in 2003.

CAMBODIA

Institutional Restructuring to Improve Cost Recovery

Mr. Ek Sonn Chan, General Director, Phnom Penh Water Supply Authority

The turn-around story of the Phnom Penh Water Supply Authority (PPWSA) is quite remarkable, since this utility was able to transform its lagging operations and achieve cost recovery over a ten-year period from 1993 to 2003. The numbers speak for themselves: service coverage

expanded from 25 percent to 85 percent; the staff/connection ratio decreased from 22 to 4; water supply availability rose from 10 hours a day to 24-hour service; the number of connections increased from 26,881 to 120,000; physical water losses scaled back from 72 percent to 16 percent; the collection ratio improved from 48 percent to 99 percent; and financially, the utility moved from being heavily subsidized to achieving full cost recovery.

PPWSA attributes its success to a combination of both external and internal factors and strategic interventions. Critical external factors included support from the government, donors and unconnected citizens in revising the tariff structure. Internal factors consisted of a fundamental change in the utility's culture to treat personnel equally, major management reorganization and increased emphasis on staff training and decentralized decision-making.

UNITED STATES

Policies for Achieving Full Cost Recovery

Mr. Khanh T. Le, Director of Special Projects, Willows Water District, Centennial, Colorado

Willows Water District in Colorado, U.S. has implemented a variety of strategies to achieve cost recovery, including targeted efforts to reduce non-revenue water, strong management policies governing operations and maintenance, internal management control, strong accounting and financial statements and public outreach programs to stay informed of both community and business needs.

The Willows Water District also consults with civil society in tariff setting and other decisions. By state law, all meetings of the District's Board of Directors involving water usage rates, budgets, connection fees and property taxes are open to the public. Public notice of these meetings must be announced in newspapers, TV and other available media, and all meetings are conducted on the record. To ensure compliance with all these mandatory public requirements, the District must submit quarterly budget-to-actual financial reports, as well as annual audit reports. Measures like these designed to enhance public involvement ultimately increase transparency and accountability of water utilities to their customers.

Strategies for Improved Management and Cost-Cutting Measures

Without the promise of significant future tariff increases, many utilities in the region have achieved improved cost recovery by adopting cost-cutting measures. Core strategies include reducing physical water losses by repairing leaks and installing high quality pipes and meters, as well as improvements in operational efficiency through reduced power, labor and chemical costs. Other strategies include improving internal management practices and procedures. In addition, some utilities have improved efficiency by establishing robust accounting, recordkeeping and billing procedures, or by creating new staff incentives and strengthening customer relations. Workshop case studies highlighted specific management and cost-cutting measures taken by successful utilities in Malaysia, the Philippines and Vietnam *(see case study presentations in Annex 8)*.

MALAYSIA

Establishing Strong Accounting, Recordkeeping and Billing Procedures

Mr. Mohd Nizamuddin bin Mokhtar, Chief Legal Officer/ Corporate Services Manager, Penang Water Supply Corporation

The Penang Water Supply Corporation has instituted several measures to strengthen cost recovery, including improving strong recordkeeping, accounting and billing procedures, as well as management practices. In particular, over the last several years, the utility has improved its collection rate to 98.2 percent by metering all connections and imposing a strict disconnection policy for defaulters.

On the management side, by establishing a universal employment policy, setting staff performance goals and encouraging teamwork, the utility has increased worker efficiency and reduced staff turnover to less than five percent per annum. The average length of service at the utility ranges from 15 to 20 years. Finally, Penang has aggressively tackled the problem of NRW by creating a committee to oversee, evaluate and approve the use and installation of high quality piping materials. By 2010, the utility aims to reduce its current NRW levels from 20 percent to 15 percent.

PHILIPPINES

Developing Innovative Measures to Reduce Non-Revenue Water

Mr. Pablito S. Paluca, General Manager, Dipolog City Water District

As part of its effort to achieve FCR, Dipolog City Water District has developed several innovative measures to reduce NRW. First, the Dipolog utility decided to centralize its water meters, which resulted in lower

installation costs, easier reading, repair and maintenance and greater control over physical water losses. To further reduce costs, the utility contracted out service installation and meter disconnection and reconnection. Finally, utility staff at Dipolog devised a low-cost sand filter system to remove iron compounds.

VIETNAM
Improving Customer-Oriented Services and Staff Incentives

Mr. Vu Phong, Director, Hai Phong Water Supply Company

For Hai Phong Water Supply Company, improving customer services, upgrading existing infrastructure and creating staff incentives are central to achieving full cost recovery. Several years ago, the utility faced a number of challenges, including intermittent water supply, aging water supply infrastructure, no devices for measuring water use and poor customer service.

As a first step to address these difficulties, the utility organized public awareness campaigns to educate the public about water treatment processing and the importance of water conservation. The utility also conducted customer interviews and annual customer satisfaction surveys to evaluate its performance and assess customer needs. On the technical side, the utility upgraded its system by installing meters and high quality piping. The utility also made a number of management improvements (e.g., develop annual business plans) and policy changes to upgrade service levels (e.g., install house connections within 15 days).

To create strong staff incentives, the company allocates 28 percent of profits into a reward fund for distribution when staff members develop innovations and successfully implement efficiency improvements. Additional monies, approximately $2,300, are added to this fund if the utility achieves a one percent decrease in NRW. Conversely, a one percent increase in NRW results in a $320 reduction from this fund.

The Social Dimension of Full Cost Recovery: Ensuring Access to Water Services for the Poor

To address social concerns about affordability of and access to water services for the poor, experts from OECD, Institute of Global Environment and Society (IGES), ADB and Poland discussed the social implications of water pricing and solutions for ensuring access. Finding the right balance between establishing financially autonomous and sustainable utilities and ensuring access to services for the poor is no small task. Case study presentations from such diverse places as China, Poland, Armenia and Asia considered tariff structures, willingness to pay and coverage issues in the context of full cost recovery *(see case study presentations in Annex 9)*.

The Social Dimension In Water Pricing - Experience from the OECD

Mr. Peter Börkey, Administrator, OECD

An inherent conflict exists between efficiency and equity in water pricing, particularly as policies move towards full cost recovery pricing. These inequities can be addressed through policies that are geared toward providing support to the poorest sections of the population.

OECD countries enjoy high access levels to both water supply and sanitation with 85 percent of the population or more connected to water supply, while in many Asian cities, the percentage is less than 50 percent. Hence, while in the OECD ensuring that water services remain affordable for the population is the main concern, in Asia, it is to provide access to centralized water services to a greater share of the population.

Within OECD countries, water prices continue to rise due to costs of increasing pollution and regulation. As a result, many OECD countries implement social measures to ensure water remains affordable to the public at large and to extend access to poor unserved populations. These social measures include progressive social tariffs like IBTs, targeted assistance for water to the poor through income assistance and vouchers, payment assistance loans and debt repayment plans, cross subsidization between different users and prohibition of water disconnection.

Asian countries should consider similar strategies in their efforts to expand service. One key consideration is connection fees, which can be 20 times more than the annual cost of water for an average family. For example, connection fees in Asian cities range from $13 in Kuala Lumpur up to a staggering $87 in Phnom Penh. The upfront payment to connect to water systems is acceptable, but only if it does not go beyond the inclusion of customer-specific costs (e.g., billing, metering, payment collection).

Affordability and Social Protection in the Water Sectors of China and Armenia

Mr. Brendan Gillespie, Head of Non-Member Countries Division, Environment, OECD

Water sector reform efforts in China and Armenia illustrate several key points about affordability and social protection. First, it is the role of governments and not utilities to directly monitor and address the social concerns about affordability of and access to water services. Second, in terms of implementation of such policies, local governments should set a social agenda for water supply under the supervision of the central authorities. Water utilities, in turn, should work closely with local governments to ensure social and political acceptability of tariff policies. And finally, while there are many lessons to be shared, local solutions will require a case-by-case approach.

In an effort to assist policymakers make informed decisions about water financing and management strategies, OECD together with Denmark developed a software program called FEASIBLE that evaluates the gap between financing sources and financing needs. Policymakers in Sichuan, China and Yerevan, Armenia, with assistance from OECD, have applied this financing model to develop infrastructure development targets and corresponding financing strategies, as well as to evaluate the ability to pay based on income growth, social protection budgets and required legal and institutional reform in their respective countries.

Several similar conclusions emerge for both countries applying FEASIBLE: (1) affordability is not necessarily a key constraint; (2) tariff increases can be deferred over time if the local government can take on debt; (3) social protection measures are necessary, but should be better targeted; and (4) utility reform can improve efficiency and boost revenues through measures, such as improved collections, metering, increased tariffs and arrears forgiveness. The bottom line is that this tool can effectively assist governments in finding their own solutions to financing water sector needs in tandem with social goals.

> *"Social protection measures to secure affordability of and access to water is the primary responsibility of governments, not utilities."*
>
> Mr. Brendan Gillespie, Head of Non-Member Countries Division, Environment, OECD *(see Annex 9)*

The Path Towards Improved Cost Recovery in Poznan, Poland

Mr. Tomasz Kayser,
Deputy Mayor of Poznan, Poland

Water sector reform in Poznan, the fifth largest city in Poland, offers lessons on the importance of gaining public support and acceptance for tariff increases, and establishing rationally-based tariff setting procedures. In practice, cost recovery in Poznan is not so much an economic problem as a social one, requiring a balancing of difficult and politically sensitive decisions.

In 1989, following the transition to a market economy, the local government of Poznan and then eventually a commercial law company assumed responsibility for the water supply system, which had fallen into disrepair after years of neglect under communist rule. Citizens had come to expect cheap, poor quality water with intermittent levels of service.

To improve the quality of Poznan's water supply and expand services to municipalities surrounding the city, the utility required substantial capital investment. Before tariff increases could be sought, however, the utility recognized the necessity of improving services to establish credibility among customers.

As a first step, the utility conducted a survey in 1999 among customers to evaluate their willingness to pay higher tariffs, and found that 49 percent of the population would accept higher charges so long as there were improved water services. Only 40 percent of surveyed customers did not favor water price increases. Next, the utility dramatically improved its water quality to convince the public that drinking water was a valuable, high-quality product, not a mere commodity.

Decentralization of water supply management in Poland gave local governments, including Poznan, direct authority to draft new legislation regulating tariffs. The new tariff-setting procedures in Poznan required the executive board of the water utility to prepare an annual tariff request with a long-term development plan outlining rationally-based calculations of tariff pricing, as well as necessary capital improvements and financing sources among other items.

According to the tariff process, 45 days after the utility submits its annual plan, the city council and mayor must review and verify the proposed tariffs and long-term investment plan. If the council does not approve the proposed tariff within 45 days, the tariff automatically comes into effect 70 days after submission of the utility's annual plan and proposed tariff increase. In practice, assuming the council approves the long-term development plan and the operational and investment costs are calculated properly, the council cannot reject the proposed tariff request. Given political reluctance to increase tariffs, these procedures help the council to achieve rationally-based and consistent decisions. *(See presentation and article in Annex 9).*

The Social / Affordability Dimension of Full Cost Pricing-Empirical Experience From Asia

Dr. Mushtaq Ahmed Memon, Senior Policy Researcher, IGES

Compared to Europe, Asian countries do not enjoy high levels of access to both water supply and sanitation. Average water tariffs in Asian cities vary widely, and in some cities, unserved and unconnected populations may pay as much for water as they do in monthly housing expenses.

In Manila, for example, a local resident can pay 1,000 pesos (about $ 17.80) per month for accommodation and 900 pesos (about $ 16) per month for 6 m^3 of water. By contrast, piped water supply users in Manila only pay about 160 pesos (about $3) per month for about 30 m^3 of water.

Central to the issue of affordability are high connection charges and low willingness to pay for water services. Connection charges often represent the greatest barrier to affordability of water services for the unconnected poor, while customer willingness to pay remains low in areas with intermittent water supply and poor water quality.

To tackle these affordability issues, utilities in Asia should focus on the quality of service and raise customer awareness about the value of water and its relationship to maintaining good health and hygiene. IBTs in some instances may also increase affordability for some users by cross-subsidizing rates and encouraging conservation behavior. Finally, by increasing operational efficiency (e.g., reduced NRW, lower O&M costs and better collections) and seeking tariffs that cover operational costs, utilities may expand coverage to better serve the unconnected poor.

Extending Access to Water Services to the Poor in Peri-Urban and Rural Areas

Mr. Januar Hakim, Urban Development Specialist, ADB

Of the 1.2 billion people worldwide who lack access to safe water supplies, most populations tend to be poor rural dwellers. For every urban person, six in the peri-urban and rural areas lack access to potable supplies, which are critical to health, well-being and productivity.

Several factors explain why the water sector in peri-urban and rural areas has trailed behind urban centers. First, providing water supply in rural areas is often a low priority, and thus has low visibility. Second, extending services to distant areas has high infrastructure costs and low investment opportunities. Lastly, knowledge of operations and maintenance also remains low given that few water supply facilities are located in peri-urban and rural areas.

Mobilizing resources to extend rural water supply will require communities, especially women, to actively participate in water governance and develop innovative community-based strategies. As a first step, building local capacity and developing skills are essential to empowering these community members.

Rural water supply projects funded by ADB apply several key policies, including combining water use and resource management, focusing lending on catalyzing water investments, utilizing low-cost appropriate technology, promoting environmental awareness, integrating woman and gender perspectives and promoting the "user pays" principle to recover costs.

Lessons learned from ADB-funded projects in Laos, Nepal and Pakistan reveal that: (1) a direct link exists between poverty and water security; (2) community involvement is critical to sustainability and financing O&M costs of rural water supply; (3) customer willingness to pay higher tariffs is directly related to better water services; (4) addressing gender concerns improves service performance; and (5) good governance is essential to the sustainability of water supply services.

regional action agenda and conclusions

Workshop presentations and discussions made clear that there is no one method or system that utilities can apply in their pursuit of cost recovery. Rather, each utility must develop its own multi-faceted approach that takes into account sector enabling conditions and employs new strategies that make best use of unique capabilities and available resources. Survey results and case studies also confirmed that to affect change, utility managers must set clear priorities and then maintain discipline in implementing new plans and solutions, often in the face of political pressure.

Workshop participants were also unanimous in their support for regional exchange as a vital and useful strategy for utilities to improve operations, and ultimately expand the supply of clean water in the region. As a regional network, SEAWUN is well positioned to facilitate this exchange of best practices and information between utility managers and operators, local governments and the public.

Strategies for Regional Collaboration

In advance of small group discussions on developing a regional FCR action agenda, a representative from Water for People (WFP), a U.S.-based NGO dedicated to promoting global access to clean water through counterpart exchange, provided information on effective strategies for regional cooperation.

Partnering for Change

Mr. Peter Nathanson, Engineer and Trainer,
Water for People (www.waterforpeople.org)

Based on Water For People's work worldwide, partnership and counterpart exchange can be effective strategies for empowering local communities to catalyze change in the water sector. Technical assessments, twinning arrangements, targeted training and mentoring can be useful tools for utilities and organizations like SEAWUN in working together to share best practices and promote dissemination of information.

Assessments provide a basis for strengthening the technical, managerial and financial capacity of utilities by identifying performance limiting factors and setting priorities. Targeted training builds capacity in priority program areas, while twinning and mentoring arrangements between utilities promote one-to-one knowledge transfer and foster sustainable relationships *(see Annex 9)*.

> *"Asian countries share many of the same development priorities, economic and institutional constraints, and political and cultural factors, and it makes perfect sense that we work together to share our common challenges and solutions. SEAWUN provides an important platform for utilities in the region to work together to achieve our goals in serving our citizens, our cities and our countries."*
>
> Dr. Prasert Chuaphuanich, Governor,
> Provincial Waterworks Authority of Thailand,
> *(see Annex 4)*

Regional Action Agenda

As a final activity at the regional workshop, participants engaged in interactive small group discussions aimed at identifying key strategies and tools for promoting FCR in the region and supporting SEAWUN in its mission. Priority focus areas included: (1) tariff pricing and affordability; (2) operational efficiency; and (3) leadership and management.

Under each focus area, workshop participants identified priority actions and identified possible implementation strategies and tools that could be employed at the regional or country levels, including country or regional lessons-learned workshops, targeted counterpart exchanges, specialized country or regional training, demonstration pilot projects, sustained utility-to-utility exchange ("twinning"), publications and/or websites *(see Table 6)*. Taken together, these findings serve as a regional action agenda for use by SEAWUN and other partner organizations, as well as individual utilities, in developing regional and country FCR initiatives.

Table 6: Regional Action Agenda for Promoting FCR

Priority Areas	Regional and Country Actions	Possible Implementation Strategies and Tools
I. Tariffs and Affordability **Objective:** Promote adoption of sustainable tariffs and adjustment policies that enable cost recovery while ensuring affordability	1. Revise national tariff legislation to reflect FCR and to improve institutions and procedures (i.e., establish linkage between capital planning and financial implications taking into account connection charges, inflation and other factors)	• Computer-based financial tools to assist utilities and governments to calculate rationally-based tariff structures • Information library and website on tariffs • Specialized regional and national trainings
	2. Develop regional guiding principles for tariff setting and FCR for authorities to develop new policies or legal requirements	• Demonstration projects at country level to apply guiding principles • Information library and website on tariffs
	3. Strengthen stakeholder awareness of critical linkage between tariffs and affordability	• Customer satisfaction surveys assessing existing service and willingness to pay • Customer-awareness programs • Specialized regional and national training
	4. Promote development of model performance contracts between utilities and local governments	• Workshops to share lessons learned and present technical information • Twinning and exchange visits to learn about roles for elected and administrative officials • Information library and website containing model performance contracts
	5. Conduct targeted studies and affordability analyses that address implications of tariff increases, subsidies, coverage expansion and connection charges	• Consultations with unserved poor • Publications and postings to website
II. Operational Efficiency **Objective:** Improve operational efficiency of utilities through adoption of innovative practices and cost-cutting methods	1. Develop NRW policies and programs addressing leakage, illegal connections, meter management, billing and collection, community participation in leak detection, etc.	• Country-level demonstration projects and publications piloting effective NRW policies • Twinning arrangements on NRW • Workshops to share information and best practices
	2. Develop regional guidelines on O&M best practices	• Specialized country and regional trainings • Twinning arrangements on O&M • Publications on O&M best practices
	3. Adopt best practices for reducing input costs, such as energy and chemicals	• Web database on suppliers and technology • Targeted counterpart exchanges

Priority Areas	Regional and Country Actions	Possible Implementation Strategies and Tools
	4. Adopt new employment practices (e.g., voluntary retirement, reduced overtime, hiring freezes and outsourcing)	• Workshops • Demonstration pilot projects testing innovative employment practices
	5. Adopt new asset management policies and procedures to optimize capital requirements	• Specialized trainings in finance, accounting and capital project prioritization methods • Benchmarking program
	6. Establish certification and training programs to improve staff performance	• Train-the-trainer programs in finance, accounting and engineering • Inventory existing training programs for staff exchanges
	7. Establish programs to create cost center/functional accounting systems	• Specialized training in cost accounting • Targeted exchange program • Demonstration pilot project and workshops
III. Leadership and Management **Objective:** Strengthen leadership and management practices of water utilities to improve overall financial performance	1. Develop action plans on utility autonomy ("true corporatization") to facilitate adoption of new employment policies, hiring practices, salary scales, etc.	• Workshops to share best practices • Study tours and twinning arrangements supported by national water associations
	2. Establish staff and management incentives via performance measures, milestones and rewards	• Consultations with SEAWUN, national water associations and boards of directors of successful utilities with strong staff incentive programs • Workshops to share best practices
	3. Develop operator certification and training programs to improve staffing capabilities, enhance transparency and provide incentives	• Regional trainings with accreditations
	4.Devise regional or provincial plans for achieving economies of scale (i.e., consolidating several contiguous utilities, regionalizing functions like billing, human resources, procurement)	• Targeted counterpart exchange • Country and regional workshops to share best practices

Concluding Remarks

Representatives from US-AEP, OECD and SEAWUN made concluding remarks at the regional workshop, reaffirming their commitment to work in partnership and promote full cost recovery among utilities in the region.

United States - Asia Environmental Partnership

Mr. Winston Bowman, Regional Coordinator

US-AEP affirmed that clean water is a top priority of USAID in Asia, and that ensuring the financial sustainability of water supply companies is central to any strategy for improving access to clean water. For US-AEP, workshop discussions validated the findings of the regional survey: appropriate tariffs, efficient operations and effective leadership are all crucial to cost recovery, which can enable utilities to increase connections, especially for both the urban and rural poor.

The preliminary action agenda created by participants will provide a useful basis for utilities, utility associations, SEAWUN, USAID and others as they work together to implement priority strategies and activities. US-AEP looks forward to working with SEAWUN in support of its first regional convention for water utilities in Hanoi in 2005 by assisting with the full cost recovery component and building on the results of this workshop.

Organisation for Economic Co-operation and Development

Mr. Brendan Gillespie, Head of the Non-Member Countries Division, Environment

OECD observed that achieving the Millennium Development Goal 7 by 2015 will require significant collaboration and cooperation. The dialogue at this workshop, however, illustrated how collaboration here in the region is possible. Reminded of the phrase, "think globally, act locally," OECD noted that there is a clear need to exchange ideas globally, but implementation is most effective locally, particularly in the water sector.

As an intergovernmental organization, OECD works closely with governments to develop affordability policies and water pricing structures that increase overall access and enable water operators to focus on producing and delivering clean water. OECD hopes to build on the productive start made at this regional workshop to support efforts to promote information and technical exchange on key issues, including tariff setting, financial planning and benchmarking.

Southeast Asian Water Utilities Network

Mr. Kumala Siregar, President

SEAWUN commended participants for their presentations and hard work in developing an action agenda for full cost recovery. With guidance and on-going support from members, SEAWUN will use its regional platform to help implement the action agenda by sharing best practices on promoting the financial strength of utilities and extending service coverage to the poor.

additional survey information

This annex provides more detailed information gathered from national water associations and utilities on the national policies and institutional arrangements for water supply sector and tariff adjustment, as well as financial and operational performance of surveyed utilities.

INDONESIA

Sectoral Overview

In Indonesia, local governments are responsible for managing water supply services. Known as PDAMs *(Perusahaan Daerah Air Minum)*, there are over 300 local government utilities. It is estimated that only five percent of these 300 Indonesian utilities achieve full cost recovery levels and that 40 percent of these utilities are unable even to recover their O&M costs. Average service coverage in urban areas in Indonesia is a mere 38 percent.

Tariff Adjustment

Tariff review and adjustment fall under the purview of the local government, as represented by mayors. Although not explicitly stated, the tacit agreement of the local councilors is also required, especially since decentralization in 1999.

In 1998, Indonesia promulgated a tariff regulation mandating that utilities recover at least O&M costs, depreciation and debt service costs (Instructions of Ministry of Home Affairs No 4/1998). As a long-term goal, this regulation requires utilities to recover costs, but also achieve a return on investment. To date, however, enforcement of this regulation has been limited, and as a result, tariff increases occur only once every five or six years.

Several reasons can explain why Indonesia has not enforced its tariff regulation:

- Enforcing a Ministerial Instruction is difficult in the face of political pressures related to tariff increases for what is considered a basic and essential service.
- After decentralization in 1999, the tariff review and adjustment process became even more politicized and subject to election cycles and political infighting between the administration and the local councilors.
- Local governments often do not have the capacity to determine whether a request for a tariff increase is rationally based and are unfamiliar with financial concepts such as depreciation.

As to social concerns about water affordability, Indonesia policy recommends that households not pay more than four percent of their income for water. Many municipalities, however, except for the larger and more capable ones, do not even investigate what percentage the resulting tariff will constitute of the average household income.

Surveyed Utilities

All four surveyed utilities – Bogor, Makassar, Malang and Medan – cover their O&M expenses and all, except for Makassar, have achieved full cost recovery (see Table 1). Also, all four utilities have received grants from national or local government agencies.

With the number of connections ranging from 70,000 to 330,000, all four Indonesian utilities are considered medium- to large-sized utilities. As the largest surveyed utility, PDAM Tirta Nadi Medan is unique in Indonesia, in that it is owned by the provincial government and serves the provincial capital, Medan, as well as several smaller towns.

In recent years, the utilities operated by Medan, Makassar and Bogor all have had significant tariff increases due in large part to innovative thinking and strategic alliances. For example, during a public consultation on a proposed tariff increase, the Makassar utility decided to invite those citizens who were at the time unserved by the utility and were paying much higher prices from vendors than connected customers.

With a tariff increase, this unserved population would directly benefit and receive piped water at a fraction of the vendor water prices. Not surprisingly, when the served population voiced its objections to the increase, the unserved population defended the proposed new rate, arguing that such opposition effectively denied service expansion to the poor unserved areas. Eventually the existing customers agreed to the proposed tariff increase, demonstrating that engaging the unserved and often

ignored population can be an effective strategy.

In Malang, prior to seeking a tariff increase, the utility first launched a public campaign to explain the need for increased water rates and the utility's proposed plan. The utility then conducted a customer satisfaction survey that asked, among other things, the level of satisfaction with the utility's service and whether customers would object to the planned tariff increase. The survey revealed that customers were generally satisfied with service and would not object to the increase. The utility then shared the results of this survey to alleviate local government concerns about public opposition when applying for a tariff increase.

In Medan, the utility made a recent tariff increase more palatable to politicians by locking in the tariff price for the poor while increasing rates for more well-to-do customers. When restructuring the pricing, the utility reduced the size of the consumption blocks, which in turn negatively affected some poor customers who had to pay more, since their consumption fell under the new higher priced consumption block.

MALAYSIA

Sectoral Overview

In Malaysia, water management is the responsibility of state governments, with the exception of Sibu Municipality where the local government has authority. There are also five legal structures, ranging from a division in a government department to a totally privatized entity. Private sector participation is significant, with companies now managing over 70 percent of the nation's water production.

Universal coverage is also the norm in Malaysia. Nationwide, 97 percent of the urban population and 86 percent of the rural population are served with piped water. Federal and state government investments, rather than tariffs, primarily funded Malaysia's extensive water service coverage.

Discussions are now underway on a new institutional framework that will shift key water functions to the federal government, consolidate the number of providers from 17 to 4 or 5 financially independent providers and establish an independent regulatory body. One factor behind this restructuring is the inability of state governments to service their debts to the federal government, since tariffs in many of the states have remained low.

Tariff Adjustment

State governments (or local government in the case of Sibu) conduct water tariff reviews and make necessary adjustments. In general, water tariffs are highly subsidized and adjustments are regarded as socially and politically sensitive issues. Although a small number of providers have increased tariffs in the last two or three years, more than half of providers have not received tariff increases in 10 to 20 years.

Tariff adjustments in the three surveyed utilities – Penang, Johore and Sibu – are consistent with this pattern, with the exception of Johore, a private provider whose concession agreement requires a certain rate of return on its investment and thus receives more regular increases.

Surveyed Utilities

Each of the three surveyed Malaysian utilities has a different legal structure: Sibu Water Board is a local government agency, owned 100 percent by the local government; Penang Water Supply Corporation (Penang WSC) is a government enterprise with the majority interest owned by the government; and Ranhill Utilities Berhad Johore is a private entity.

Penang WSC is considered one of the best-managed utilities in Malaysia due in large part to its billing and collection practices and strong management. Penang WSC attributes its success to corporatization of the entity. Penang WSC boasts very low NRW levels (20 percent) and production costs, which at $0.05/m3 are the lowest of all the surveyed utilities across the region.

Interestingly, in assessing its own performance, Penang WSC did not place much importance on improving cost recovery through tariff increases, despite having one of the lowest tariffs in Malaysia. Rather, Penang WSC identified cost-cutting measures and other revenue enhancement strategies – a technique that is shared by other financially successful utilities in the region.

In contrast to the other two utilities surveyed, Sibu placed highest importance on its relationship with local government in achieving cost recovery. Perhaps this can be explained by the fact that Sibu is a local government agency, while the other two utilities are a private entity and a partially-owned government enterprise.

All of the surveyed Malaysian utilities cover their O&M costs and all, except Sibu, achieve full cost recovery. Furthermore, the financial and operating ratios of the surveyed utilities firmly support the fact that, all things

being equal, larger utilities operate more efficiently as a result of economies of scale.

Johor and Penang, which are respectively 10 and 18 times larger than Sibu, operate on about half the staff per 1,000 connections and have 75 percent lower production costs. All three surveyed utilities have significant surplus water production capacity and almost 100 percent coverage. Accordingly, they will probably not require significant additional capital expenditure in the near future.

PHILIPPINES

Sectoral Overview

As in Indonesia, water supply is the responsibility of local governments, which follow two institutional models: (1) external provision by local corporate utilities (referred to as Water Districts); and (2) internal provision by local governments themselves. Local governments with urban populations of more than 20,000 people typically establish a separate Water District. The majority of the 448 operating Water Districts in the Philippines are considered small by international standards.

Tariff Adjustment

Compared with utilities in other countries in the region, particularly in Indonesia, Malaysia and Thailand, the Philippine Water Districts are able to secure sufficient tariff increases to cover their actual service costs. Responsibility for tariff setting and technical assistance rests with the Local Water Utility Administration (LWUA), a national, technical organization. Subject to less political pressure, LWUA typically adheres to its tariff policy, which advocates for rates to reflect the full cost of service delivery. Thus, while Water Districts do not receive any form of government assistance, whether for capital or operational expenditures, they do receive regular tariff increases.

The fact that the tariff review process takes place at the central level, removed from the public, however, does not mean that the public is not involved on a proposed tariff adjustment. In fact, the public's input to a proposed adjustment is mandatory.

After LWUA determines that a proposed adjustment is justified, the Water District is required to hold a public hearing and invite LWUA officials. Following the public hearing, the Water District must adopt a resolution approving the new water tariff and forward this along with the public hearing documents (e.g., minutes of public hearing, attendance sheet) to LWUA for confirmation.

To further assist utilities, Philippine national policy allows water utilities to increase rates by up to 60 percent and to approve two- or three-step incremental increases in one review process. The Metro Leyte utility provides an example of such an adjustment; water rates increased by over 50 percent for each non-wholesale customer type between May and December 2003.

Compared to Water Districts, local governments have much greater difficulty obtaining the necessary tariff adjustments, since the tariff review process is conducted at the local level. This finding supports the view that tariff reviews undertaken by entities vulnerable to political pressures, such as local governments, tend to be more difficult and unpredictable, and that tariff reviews should either be conducted by an independent expert-based entity or at least receive input from an expert-based entity.

Surveyed Utilities

With the number of connections ranging from 7,000 to 25,000, the three Water Districts – Dipolog, Marilao and Leyte – are small as compared to other utilities in the region. In the Philippines, however, these selected utilities are classified as "average" or "big."

In contrast to other surveyed utilities, none of the Philippine utilities assigned great importance to government relations, which can be explained by the tariff adjustment process. Rather, all three utilities ranked attitudes and professional background of the managers as the most important factor in achieving FCR.

Perhaps due to their small size, the Philippine Water Districts have developed innovative approaches for capturing service delivery costs. For example, Philippine utilities group two to ten water meters in one location to simplify installation, maintenance and reading and to eliminate meter tampering.

In Dipolog, the utility implements capital projects itself, unless special expertise, such as a geo-resistivity survey, well-drilling or pile-driving, is needed. In fact, even in contracts with experts, one objective is to increase the in-house capacity to minimize future outsourcing.

In Marilao, the utility requests new customers to make an "equity" contribution to the utility in return for installing a connection. This contribution is then repaid to the customer over a two- to three-year period by offsetting water bills and paying the balance by check at the end of the period. In the past, these funds have also been used as matching funds against government grants. This practice has provided Marilao with a mechanism to fund

a portion of its network extension expenditures.

As a result of rate increases and targeted efforts to reduce expenses, all three surveyed utilities are able to cover all of their O&M costs and achieve FCR, with the exception of Leyte, which is expected to achieve FCR in 2004 as a result of substantial rate increases initiated in December 2003.

As with many of the other surveyed utilities in the region, all three Philippine utilities have surplus water production capacity, which reduces their capital expenditure requirements for production in the future. However, given the low service coverage in the Philippines, ranging from a low 35 to 50 percent, additional capital resources will clearly be required to meet growing distribution needs.

THAILAND

Sectoral Overview

In Thailand, the two state-owned enterprises serve the majority of the country - a centralized arrangement that is unique in the region. The Metropolitan Waterworks Authority (MWA) serves Bangkok and two surrounding provinces of Nonthaburi and Samutprakarn (1.5 million connections), while the Provincial Waterworks Authority (PWA) serves the remaining 73 provinces (1.9 million connections) with its 225 affiliated waterworks. (Individual cities, however, are able to opt out of PWA's system). Both are government-owned enterprises and report to the Ministries of Finance and Interior.

Thailand's water sector also relies on private entity funding and management, having established several small- and large-scale public-private partnerships (PPP). PWA, for example, has entered into several service and management contracts, as well as build-own-operate-transfer (BOOT) projects.

One of the more notable PPPs is the $152 million Pathum Thani BOOT project engineered in 1995 between PWA, an international water company and several local management, engineering and financing companies. Another example of private sector involvement is East Water, a privatized utility that is servicing the bulk of industrial users on the eastern seaboard. Although Thailand has a policy in place to promote privatization of its state-owned enterprises and decentralized units, there is considerable local resistance to this policy.

One notable feature of the Thai water sector is how the government's establishment of key performance indicators (KPIs) and targets in 1996 has induced improved performance at both water authorities. Each year, water authorities negotiate indicators and targets with the Ministry of Finance under the TRIS (Thai Rating and Information Services) program.

Indicators can vary from year to year, depending on priority areas during that particular year (see Box 1 for KPIs applied by MWA). In recent years, governance has become increasingly important, and in fact, in 2004, indicators under the governance category received the highest weighting of all categories.

MWA and PWA have also applied these indicators to each of their divisions and units. PWA took the KPI system one step further and adopted a scorecard to evaluate staff member performance based on the same KPIs applied to the organization as a whole. Measuring individual, departmental and organizational performance has resulted in overall improved performance of operations.

Box 1: Key Performance Indicators for MWA

Category	Indicator
Efficiency	• Net profit • New customers • Pressure • Account balance • E-procurement • Appointment of Chief Financial Officer
Financial	• Cost of production • Cost of service/customer • Cost of administration/total revenue • Unaccounted-for-water
Customer Service	• Speed in responding to complaints • Service to customer - Time to change customer type - Time to change customer name - Time to temporarily disconnect • Number of areas where water is potable
Administration & Organization	• Development of a Management Information System • Plan to become a publicly listed company • Progress in implementing the privatization plan • Economic value added
Governance	• Transparency - Board of directors has no conflict of interest - Declaration of earnings by board of directors - Access to information • Internal Control

Rewards for meeting targets include government recognition and increased autonomy in operations. MWA, for example, now has more discretion in setting salaries for employees based on its high performance rating and national government awards.

Tariff Adjustment

Thailand has not adopted regulations or policies mandating tariff rates that ensure cost recovery. The tariff structure in Thailand is uniform nationwide in order to allow for cross subsidization between richer and poorer regions. Securing tariff adjustments continues to be a political and ad-hoc process that requires extensive lobbying in advance of an increase request.

Theoretically, MWA has more autonomy than PWA in setting tariffs because its board of directors has the authority to adjust water pricing. In practice, however, the MWA board only approves an increase if there is a positive signal from the government. PWA must apply through the Ministry of Interior to obtain cabinet-level approval for tariff adjustments. Given this difficult political process, it is not surprising that PWA has not received a tariff increase since 1998.

Surveyed Utilities

With O&M ratios of 0.32 and 0.33 respectively, both PWA and MWA are performing significantly better than other surveyed utilities, whose ratios range from 0.5 to 0. 9 *(see Figure 1)*. Furthermore, MWA outperforms all other utilities with an FCR ratio of 0.6. In fact, MWA has been operating at a profit for more than 15 years and does not receive any government support. PWA, on the other hand, still receives government support due to the sizeable investment required to expand coverage to rural areas throughout Thailand.

It is worth noting that of all the surveyed utilities, only the Thai ones have implemented specific programs to improve staffing efficiency (as measured by number of employees per 1,000 connections). Improving staffing efficiency can significantly improve FCR, since labor costs are often a utility's single largest operational cost. Thai programs to improve staffing efficiency include early retirement, hiring freezes and outsourcing of meter reading.

As a result of hiring freezes, PWA has reduced its staffing efficiency ratio from 4.86 to 3.32 in the period between 1998 and 2002. Although compared to other utilities of similar size, such as Penang and Johore, however, there still seems to be room for improvement for PWA in this respect *(see Figure 2)*.

While economies of scale certainly play an important role in the positive performance of both Thai utilities, PWA is currently exploring the prospects of decentralizing its operations.

VIETNAM

Sectoral Overview

Vietnam's 67 provincial governments operate Provincial Water Supply Companies (WSCs) throughout the country. Service coverage in urban areas ranges between 40 and 50 percent.

Tariff Adjustment

Historically, the central government funded all capital investments in the water sector and only required tariffs to recover O&M costs and address affordability, even though there were no specific affordability guidelines. As a result of this policy, water tariffs were often lower than production costs. The Provincial (or City) People's Committees were responsible for reviewing and approving tariffs, though tariff adjustments were irregular and at best took four to five years to implement.

In 2004, in an effort to accelerate cost recovery, the central government issued Directive 04/2004 requiring all WSCs to set tariffs based on the full and accurate inclusion of all O&M costs, depreciation, debt payment and return on investment. In the long term, this Directive also mandates tariff pricing to cover new investments.

Two WSCs have already adjusted their tariffs to comply with the directive and it is anticipated that other utilities will adjust their tariffs by early 2005. The Vietnamese Water Supply and Sewerage Association is confident that all companies will be able implement this policy by the target date. Overall, Vietnam's new policy sets an important precedent for the region.

Surveyed Utilities

Surveyed utilities represent the three geographic regions: Hai Phong (north), Thua Thien Hue (central) and Ba Ria Vung Tau (south). All three utilities have strong O&M and FCR ratios and two of the three – Hai Phong and Thua Thien Hue – have significant idle production capacity, 31 percent and 43 percent respectively.

The third utility, Ba Ria Vung Tau, also has a high idle production capacity, which it attributes to an effective capital investment ranking system. Nationwide, idle production capacity is estimated at 22 percent.

NRW levels in all three surveyed utilities are good due in part to the relatively new water supply infrastructure. Ba Ria Vung Tau's non-revenue water loss at 15 percent is particularly impressive and can be attributed to accurate and regularly calibrated meters at the point of production and consumption, as well as the use and careful installation of high quality materials.

Also notable is the abbreviated collection period (2-10 days) as compared to 30-90 days for the other surveyed utilities or the World Bank's recommended 90 days. Reasons cited for this low collection period include the use of "collectors" whose bonuses are tied to their performance and a strict disconnection policy for non-payment.

The Hai Phong utility identified improved customer service as a key factor to increased cost recovery. The activities it undertook to improve customer service included: (1) annual staff training courses to improve communications and customer management skills; (2) rapid response to complaints, leaks and new connection requests; and (3) customer satisfaction surveys.

All three Vietnamese utilities fully cover O&M costs, which account for less than 60 percent of revenues, though none has achieved FCR in the conventional sense. Thua Thien Hue, for example, allocates all profits (about 15 percent of revenues) to business development, financial contingency and bonus and welfare funds.

workshop agenda

Regional Workshop
Achieving Full Cost Recovery for Water Utilities in Southeast Asia:
Sharing International Experience and Best Practices

Four Seasons Hotel, Pimarnman Room
Bangkok, Thailand
December 13-14, 2004

DAY 1: MONDAY, 13 DECEMBER 2004

8:30 – 9:00 **Registration**

9:00 – 9:15 **Opening Remarks**
Dr. Prasert Chuaphanich, Governor, Provincial Waterworks Authority of Thailand

9:15 – 9:30 **Welcoming Remarks**
Mr. Timothy Beans, Mission Director, USAID Regional Development Mission for Asia

9:30 – 9:45 **Program Objectives**
Mr. Kumala Siregar, President, Southeast Asian Water Utilities Network (SEAWUN)

9:45 – 10:15 **Achieving Full Cost Recovery (FCR): Principal Challenges and Solutions**
Mr. Scott Jazynka, Sr. Finance Specialist, US-AEP

10:15 – 10:30 Coffee Break

10:30 - 12:30 Session 1: Country Overviews for Cost Recovery – Survey Results and Discussion

Moderator:	Ms. Laila Suryodipuro, Sr. Municipal Infrastructure Specialist, US-AEP
Indonesia:	Mr. Godman Ambarita, Executive Director, PERPAMSI
Malaysia:	Mr. Mohmad Asari Daud, Consultant
Philippines:	Mr. Fernando Diaz, General Manager, Marilao Water District
Thailand:	Mr. Pisit Hongvanishkul, Director of Policy and Planning Division Provincial Waterworks Authority (PWA)
Vietnam:	Mr. Nguyen Quoc Quyen, Vietnam Water Supply and Sewerage Association
Discussion	

12:30-2:00 Lunch at Ratana-Kosin Room (Second Floor)

2:00 – 5:15	**Session 2:**	**Utility Experience and Best Practices in Achieving Full Cost Recovery**
2:00 - 3:30	Panel 1:	Utility Case Studies in Improved Cost Recovery: Strategies for Improved Policies and Institutional Arrangements
	Moderator:	Mr. Scott Jazynka, Sr. Finance Specialist, US-AEP
	Indonesia:	*Optimizing Tariffs through Effective Relationships with Local Government* Mr. Subahri Ritonga, Administration and Finance Director, Medan Water Utility
	Cambodia:	*Institutional Restructuring to Improve Cost Recovery* Mr. Ek Sonn Chan, General Director, Phnom Penh Water Supply Authority
	United States:	*Policies for Achieving Full Cost Recovery* Mr. Khanh T. Le, Director of Special Projects, Willows Water District, Centennial, Colorado
	Discussion	
3:30 - 3:45	Coffee Break	
3:45 - 5:15	Panel 2:	Utility Case Studies in Improved Cost Recovery: Strategies for Improved Management and Cost Cutting Measures
	Moderator:	Ms. Laila Suryodipuro, Sr. Municipal Infrastructure Specialist, US-AEP
	Malaysia:	*Establishing Strong Accounting, Recordkeeping and Billing Procedures* Mr. Mohd Nizamuddin bin Mokhtar, Chief Legal Officer/ Corporate Services Manager, Penang Water Supply Corporation
	Philippines:	*Developing Innovative Measures to Reduce Non-Revenue Water* Mr. Pablito S. Paluca, General Manager, Dipolog City Water District
	Vietnam:	*Improving Customer-Oriented Services and Staff Incentives* Mr. Vu Phong, Director, Hai Phong Water Supply Company
	Discussion	
5:15-5:30	**Wrap-up and Closing Remarks** Mr. Kumala Siregar, President, SEAWUN	

DAY 2: TUESDAY, 14 DECEMBER 2004

8:45-9:00 Introduction for Day 2
Mr. Kumala Siregar, President, SEAWUN

9:00 – 12:00 Session 3: The Social Dimension of Full Cost Recovery: Ensuring Access to Water Services for the Poor

9:00-10:30 *The Social Dimension In Water Pricing - Experience from the OECD*
Mr. Peter Börkey, Administrator, OECD

The Path Towards Improved Cost Recovery In Poznan, Poland
Mr. Tomasz Kayser, Deputy Mayor of Poznan, Poland

Affordability and Social Protection in the Water Sectors of China and Armenia
Mr. Brendan Gillespie, Head, Non-Member Countries Division, OECD

Discussion

10:30-10:45 Coffee Break

10:45-12:00 *The Social / Affordability Dimension of Full Cost Pricing-Empirical Experience From Asia*
Dr. Mushtaq Ahmed Memon, Senior Policy Researcher, IGES

Extending Access to Water Services to the Poor in Peri-Urban and Rural Areas
Dr. Januar Hakim, Urban Development Specialist, ADB

Discussion

12:00-1:30 Lunch at Montathip 4 Room (Ground Floor)

1:30 - 4:45 Session 4: Next Steps for Achieving Improved Cost Recovery in Asia

1:30 – 2:00 *Water for People: Partnering for Change*
Mr. Peter Nathanson, Engineer & Trainer, Water for People

2:00 – 3:30 *Small Group Discussions: Priorities for Promoting FCR and Strategies for Collaboration*

Co- Facilitators:
Ms. Laila Suryodipuro, US-AEP and Mr. Brendan Gillespie, OECD
Mr. Scott Jazynka, US-AEP and Mr. Peter Borkey, OECD
Mr. Peter Nathanson, Water for People, and Dr. Mushtaq Ahmed Memon, IGES

3:30-3:45 Coffee Break

3:45-4:45 Report Out and Recommendations
Moderators: Ms. Laila Suryodipuro, US-AEP
Mr. Scott Jazynka, US-AEP

4:45-5:00 Wrap Up and Closing Remarks
Mr. Winston Bowman, Regional Coordinator, US-AEP
Mr. Brendan Gillespie, Head, Non-Member Countries Division, OECD
Mr. Kumala Siregar, President, SEAWUN

annex three

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SUCCESSFUL TECHNOLOGY TRANSFER FOR DEVELOPMENT

INSIDE

USAID's US-Asia Environmental Partnership (US-AEP) program worked for over a decade to transfer and encourage the use of environmental technologies, know-how, and best practices in industries, businesses, policy making organizations, and community programs in Sri Lanka. As a result, US-AEP catalyzed many successful projects, benefiting both the people and environment of Sri Lanka. A large portion of this success was due to the flexible programming tools used by US-AEP to support activities.

US-AEP tools used to facilitate project design and implementation included exchanges, technology demonstrations, technical assistance, workshops, and short- to medium-term partnerships between US and Asian institutions. At the core of US-AEP/Sri Lanka's strategic approach in applying these tools was the promotion of partnerships between public and private organizations in Sri Lanka and counterparts in the U.S. and other Asian countries that facilitated exchange of technology and expertise.

This document provides an overview of the programming tools used by US-AEP, the strategic partnering approach followed in applying these tools, and "lessons learned" from a decade of program implementation in Sri Lanka.

BRINGING STAKEHOLDERS TOGETHER

For over ten years, US-AEP brought together local stakeholders and international environmental experts to rigorously identify environmental challenges and technical needs in Sri Lanka. US-AEP also supported partnerships between these groups to identify and implement appropriate solutions.

US-AEP IN SRI LANKA

US-AEP was a regional program of the U.S. Agency for International Development (USAID) that worked from 1992 to 2005 to address the environmental challenges associated with urbanization and industrialization in Asia. Over the years US-AEP supported initiatives in eleven countries (Hong Kong, South Korea, India, Indonesia, Malaysia, the Philippines, Sri Lanka, Singapore, Taiwan, Thailand, and Vietnam) partnering local governments, businesses, NGOs, and academic institutions with US counterparts. In 2005 alone, US-AEP worked with over 300 regional partners supporting the efforts of 67 program initiatives working to:

- Improve water quality and supply
- Clean the air
- Strengthen environmental governance
- Improve solid and hazardous waste management

US-AEP countries face the dual challenge of promoting economic growth while also trying to reduce the negative environmental impacts of that growth. US-AEP contributed to this process of "green development" by increasing access to and knowledge of technologies and processes through partnerships and collaborative approaches. As a regional program working in countries with similar environmental challenges, US-AEP also had the ability to leverage and multiply impacts for the benefit of each individual country as well as the Asia region as a whole.

In Sri Lanka, the US-AEP program started in 1995. From the outset, the program promoted partnerships and collaborations to identify and introduce better environmental practices in the country. Interventions included assistance to develop or change policy and legislation, improve awareness of environmental issues, and identify and promote best practices and technologies to address environmental problems. Technology transfer in particular was a key program element.

Adaptation of new technology is essential to solve existing and emerging challenges of development and environmental degradation. Partnerships are a valuable platform that can help discern the appropriateness and best use of different technologies, allow for the pooling of resources and expertise, and facilitate wide buy-in. The experience of utilizing US-AEP program tools and the implementation strategy in Sri Lanka has provided valuable insights into partnering for successful transfer of technology for environmental management.

US-AEP TOOLS

As in other Asian program countries, US-AEP in Sri Lanka used grants, exchanges, and technical assistance to support program initiatives.

GRANTS

Targeted grants proved to be a particularly useful tool in promoting the transfer of technology and expertise to Sri Lanka. Grant mechanisms included: (1) the State Environmental Initiative -- matching grants of up to $150,000 awarded to U.S. state agencies that linked American expertise with Asian demand for environmental improvements; (2) Environment and Civil Society Partnership grants of up to $25,000 to Asian non-governmental organizations to encourage collaborative public-private environmental improvement efforts; and (3) Technical Support and Quick Response Grants of up to $25,000 provided to local and U.S. organizations supporting a wide range of environmental activities.

Individual grants were not simply awarded in support of a series of one-off activities. Instead US-AEP/Sri Lanka strategically issued grants to support specific activities that contributed to a broader agenda or initiative and the exploration of innovative ideas. Grants encouraged research to address knowledge gaps and the pooling of resources towards meeting project costs. Grants helped to build links with a wide range of partners and institutions while also providing support to good ideas and projects undertaken by other donors, private, and/or public sector entities.

EXCHANGES

A distinctive feature of US-AEP throughout its history was its support for efforts to bring together Asian and U.S. participants to exchange experiences and knowledge on environmental issues. These exchanges allowed Sri Lanka in professionals to gain first-hand exposure to new technologies, policies, and management approaches and to see how these are being applied in other countries. These experiences greatly enhanced subsequent adaptation of such mechanisms in Sri Lanka.

Exchanges allowed Sri Lankan participants to explore a wide range of environmental subjects and also helped to fast track solutions to specific problems, address technology gaps, and explore new solutions. Exchanges increased the awareness of environmental problems and solutions within the country while also giving participants a chance to improve their knowledge and interact and learn from the experience of others. These interactions cultivated important links between Sri Lankan and foreign experts in the same business.

In just the last four years, through US-AEP, over 100 Sri Lankans participated in more than 50 forums exploring a wide range of topics, including: air, water and noise pollution management, solid waste and hazardous waste management, legal procedures and policy development, vehicle emissions testing, hydroponics, aquaculture, municipal services delivery, GIS, environmental journalism, and environmental education.

TECHNICAL ASSISTANCE

An important US-AEP program strength was the ability to deliver timely and appropriate technical expertise. Short-term technical assistance (STTA) contracts allowed US-AEP to bring in U.S. or regional experts to work with Sri Lankan peers to transfer information and knowledge in particular technical areas.

Often, when a technical need was identified by a Sri Lankan organization, US-AEP was able not only to fund the technical assistance, but also use formal partnerships with U.S. government agencies and industries and other Asian institutions to identify appropriate technical experts to work alongside Sri Lankans. Particularly helpful in this regard was the program's relationships with the U.S. Environmental Protection Agency (EPA) and U.S. state organizations from Minnesota, Wisconsin, and Arizona. Given Sri Lanka's small size, linkages with U.S. states were particularly useful because states deal with problems of a similar scale.

In addition, US-AEP/Sri Lanka benefited greatly from USAID's Environmental Technology Network for Asia (ETNA). ETNA performed technical research to brief US-AEP staff on technology options and identified companies that could provide different technologies. ETNA also sent out "technology needs" announcements to U.S. vendors to facilitate direct contact between Sri Lankan government agencies and companies and U.S. companies that could provide them with appropriate technical solutions.

Given US-AEP's regional focus, expertise also was available from individuals within the region facing similar circumstances -- good allies in technology transfer.

SOLID WASTE SOLUTIONS THROUGH PARTNERSHIPS

A state-of-the-art garbage system is turning some of Colombo's mountains of waste into marketable compost, easing the capital's disposal problems and offering hope for other cities. The system is a result of a public-private partnership between Burns Environmental Technologies Ltd., a U.S. company, and Colombo's Municipal Council, which US-AEP supported through grants, exchanges, and technical assistance over four years.

US-AEP assistance added value to a micro-finance based community recycling initiative by improving the plastic processing technology that in turn increased the marketable price of plastic in the city of Galle. More than 45 small women's groups derive an income, make compost, and receive small loans from this waste trading scheme that is being implemented by the Arthacharya Foundation (NGO). The City of Galle has also benefited from a reduction of the municipal waste stream by 20%.

A solid waste management solution was implemented in the Karapitiya Regional Teaching Hospital in the Southern Province. The introduced system first separates the waste into organic, plastic, paper, hazardous waste, etc., and then, uses the organic food waste to generate biogas for cooking. The plastics and paper are sold to recyclers and the slurry (a by-product from the biogas production) is used as fertilizer in a home garden in the hospital premises. This has reduced fuel costs, generated some income and solved the solid waste problem in the hospital. This pilot waste to energy model was developed through a US-AEP small grant administered by the Asia Foundation and implemented by the NGO, HELP-O.

Through a Council of State Governments grant, the Minnesota Technical Assistance Program (MnTAP) worked with two Sri Lankan institutions, the Industrial Technology Institute and the Small and Medium Enterprise Development Project to set up an internet based waste exchange mechanism to link industries to exchange re-usable waste materials and reduce the amount of materials ending up in garbage dumps.

STRATEGIC PARTNERING APPROACH

Environmental management was introduced to Sri Lanka in the 1990s but the implementation of best practices and enforcement of environmental regulations was slow due to the priority given to poverty reduction and rapid economic growth. In addition, the institutional expertise and knowledge needed for better environmental management was not readily available. USAID saw the potential value of partnering local Sri Lankan groups with organizations outside the country to solicit needed expertise, supplement local resources, and promote local "champions" committed to implementation of environmental safeguards.

To this end, US-AEP used available program tools in concert to address priority environmental technology and policy needs in Sri Lanka. The core US-AEP/Sri Lanka strategy was to promote U.S.-Sri Lankan partnerships that facilitated application of new technological solutions via a careful, staged approach. Different combinations of tools were used to flexibly support efforts at each stage of partnership development:

IDENTIFY NEEDS

- ***Identify a technical need.*** Being a demand-driven program, US-AEP typically relied on Sri Lankan organizations to articulate needs. However, US-AEP also used exchanges to expose Sri Lankan participants to unfamiliar environmental technologies and policies in the US and other Asian countries. This exposure often piqued interest in particular environmental problems and led to requests for US-AEP assistance to begin addressing associated needs.

- ***Develop an in-depth understanding of the need.*** Before initiating support to address a particular need, US-AEP critically identified the relevant political climate, influential decision makers, business practicalities, in-country capacity available, and potential solutions.

IDENTIFY PARTNERS & SOLUTIONS

- ***Identify appropriate technologies and potential organizations to provide solutions.*** Matching technologies, partners, and applications is the basis of a strong partnership. If an unknown organization volunteered participation or a new technology was identified, US-AEP used its U.S. and Asian partner contacts to investigate and evaluate them.

- ***Identify appropriate local partners.*** US-AEP performed due diligence evaluations of local partners to determine which organization would be best suited for implementing the technology transfer. US-AEP developed buy-in among these local partners by selling the benefits of participation and providing the resources needed for partnership building.

- ***Assist with creating the connection.*** US-AEP used exchanges, grants, and technical assistance to help Sri Lankan organizations to develop contacts with potential US and Asian partners as well as amongst stakeholders within the country.

- ***Convene stakeholders.*** US-AEP funded various forums to bring together stakeholders to review and prioritize objectives, design programs and to determine the necessary next steps. These forums were a monitoring mechanism as well as a means to identify knowledge gaps and other needs. Networking and establishing a common agenda was a vital part of the initial process to determine how the project would proceed. These open forums also promoted accountability and transparency in the process.

- ***Conceptualize the partnership format.*** US-AEP worked with the partners to cooperatively develop a project strategy including a definition of the roles and responsibilities of each partner.

PROMOTE PARTNER RELATIONSHIPS

- ***Initially manage the partner relationship.*** In the partnership's infancy, US-AEP provided guidance on implementation, suggestions for project timelines, and resources to support partnership interaction and joint activities.

- ***Capacity building and knowledge transfer.*** US-AEP mixed and matched available program tools to increase the technical capacity of Sri Lankan partners and enhance the sustainability of project outcomes. In many cases, several partners supported by US-AEP worked at different levels on the same topic and contributed to the whole.

- ***Continual follow-up to ensure success.*** A key to successful partnership building is continual and open communication with partners. As much business in Sri Lanka is done in-person, this required facilitation and financial support for face-to-face interactions. Follow-up by US-AEP staff was also required to maintain momentum toward attaining desired results.

IDENTIFYING TECHNICAL NEEDS

A groundbreaking US-AEP sponsored study of vehicle emissions using remote sensing technology has laid the scientific base for identifying high polluting vehicles and targeting vehicle types in emission control. A good baseline of fleet characterization and air pollutants now exists to measure the effectiveness of the new national vehicle emission testing program.

TREATMENT TECHNOLOGY PARTNERING

Lacking locally available treatment technologies, Sri Lanka has been unable to enforce service station wastewater regulations. A US-AEP-sponsored study identified and successfully piloted an appropriate technology marketed by Carbonair, a U.S. company, which recycles used oil and treats remaining wastewater.

TECHNICAL SOLUTIONS FOR MANAGEMENT

The capacity to effectively use Geographic Information System (GIS) map data in Sri Lanka is limited. US-AEP partnered with the Asian Institute of Technology to train the Sri Lanka's Urban Development Authority in GIS data processing and sharing. These trainees are already applying their new skills to post-tsunami environmental rehabilitation and planning new cities.

WHAT WAS LEARNED

US-AEP's decade of work in Sri Lanka has highlighted some keys to successfully catalyzing technology partnerships that address environmental problems. At the same time, these lessons learned may well be instructive to organizations promoting international partnering in other sectors.

Recruit the Right Local Partners and Champions

Identification of the right local partners was essential to each project's success. To be sustainable, projects needed to be supported by knowledgeable, qualified and committed partners that could champion the projects over time. The ideal US-AEP partner in Sri Lanka typically had a mix of the following qualities:

- High technical and management capabilities
- Strong communication skills that could reach from the grass-roots to the government advocacy level
- Familiarity with the Sri Lankan investment/regulatory atmosphere
- Internal resources sufficient to wait out project timeline/project ramp-up or lag time
- Operational transparency
- Ability to think "out of the box" in an adaptive and innovative manner
- International track record
- Ability to communicate in English

Allow for Building Local Partner Capacity

It was often challenging to find local partners that fully fit the desired partner criteria. As an alternative, US-AEP sometimes engaged existing partners with new tasks outside their current skill set while simultaneously supporting organizational capacity building via:

- Training opportunities in Sri Lanka and abroad
- Increased exposure to new technologies
- Instruction on international business protocols, e.g., writing emails, contract negotiation
- Promoting professional association linkages, both in Sri Lanka and internationally

US-AEP/Sri Lanka viewed capacity building among Sri Lankan organizations, government, and businesses as a fundamental programmatic goal. These activities helped various Sri Lankan organizations become more active internationally and develop professionally. Particularly important professional skills that US-AEP helped to develop were the capacity to analyze technological needs and use critical thinking to propose solutions and use sound scientific criteria to assess them.

Support Benchmarking

Collection of extensive, high quality data is necessary to track the impact of environmental pollution abatement efforts. Given the dearth of such data in Sri Lanka, US-AEP saw the value of supporting "benchmarking" of environmental conditions and gathering monitoring data on a regular basis to guide design and implementation of projects.

US-AEP supported the establishment of the first benchmarks for a variety of environmental indices (e.g., levels of ambient lead, noise pollution, and vehicle emissions) by providing grants to organizations for sampling and monitoring work. These data allowed Sri Lankan scientists to quantitatively describe current environmental impacts, and were then used to guide scientists and policy makers in identifying appropriate policy and pollution control strategies.

These efforts not only helped target US-AEP support more effectively, but left behind vital information for the Sri Lankan government in support of its ongoing pollution control efforts.

Energy efficiency through best practices and benchmarking

US-AEP Sri Lanka has worked with the Alliance to Save Energy (ASE) to initiate energy efficiency practices in the water supply sector and the tourism sector in Sri Lanka.

ASE worked with the staff of the National Water Supply and Drainage Board to improve energy efficiency through better management (scheduling operations) and technical interventions (power factor corrections, etc). These interventions have led to reductions in monthly total electricity (kVA demand) by about 20%. Energy Audits were also carried out in two water treatment plants and these audits were able to show how savings are possible through energy efficiency and this has generated much interest in the NWS&DB on energy efficiency practices.

In the tourism sector, The USAID sponsored "Tourism Cluster" worked with US-AEP and ASE to implement a database system to benchmark the energy saving potential at different operational levels in a hotel, such as, lighting, air conditioning, water pumping, kitchen operations, wastewater treatment, etc. The interventions include identifying areas of potential savings and introducing technical and financial systems to facilitate implementation. Some of the hotels involved in this benchmarking exercise that were affected by the Tsunami are now incorporating some of the recommended changes in the rebuilding process.

PARTNERING ON TSUNAMI RELIEF

In January 2005, US-AEP assisted the US based ITT industries to form a partnership with ISB to facilitate the donation of water purification equipment to communities affected by the Indian Ocean Tsunami. This collaboration enabled the rapid installation of equipment that provided drinking water for more than 25,000 people. US-AEP provided guidance, raised funds and facilitated local linkages that allowed for the successful deployment of this emergency response.

A KEY LOCAL PARTNER: Industrial Services Bureau (ISB)

Because ISB exhibited many desirable local partner qualities and willingly worked to develop them further, US-AEP/Sri Lanka developed a close working relationship with this engineering consulting company. Central to the value of the ISB relationship was the organization's ability to "screen" environmental technologies to judge their appropriateness for Sri Lanka. Some of the resulting successful partnerships are as follows:

- US-AEP supported several exchanges that facilitated ISB staff participation in the Arizona–Sri Lanka State Environmental Initiative. Through this initiative ISB was linked with South West Wind Power, based in Flagstaff, AZ, and pilot tested the feasibility of establishing small off-grid wind turbine projects to provide power to a rural population where grid energy was not feasible. This pilot not only provided electricity to 35 homes on a remote island (Bathalandunduwa) but has also generated interest among several donors and tourism developers in using the small wind turbines in development and commercial projects.

- ISB also capitalized on contacts made with Environmental System Products (ESP) of Arizona to carry out a US-AEP sponsored study on vehicle emission characteristics to identify the type of vehicles that need to be targeted for emissions control. ISB and ESP together were then able to secure a government contract to implement a mobile vehicle emission testing program in Sri Lanka.

- Through another state initiative with Minnesota and Wisconsin, ISB identified several products to improve wastewater management, specifically oil-water separators and aerators. They also established trade links with several US-based companies that market these products.

- Exchanges also allowed ISB to develop important relationships with Sri Lankan officials and US companies that contributed to increasing the skills and capacity within the organization.

- US-AEP-supported exchanges led ISB to realize the need for awareness programs and scientific interpretation of observations. As a result, ISB created the non-profit organization Wayamba Integration for Growth and Sustainability (WINGS) that promotes rural development and assists in rural industrialization, while safeguarding the environment. Through their main program component, the Community Led Environmental Action Network (CLEAN), WINGS promotes environmental awareness through active participation of school children and the general public.

The decade long US-AEP and ISB relationship has helped ISB to develop its capacity and expand its work into new environmental management areas. This development of environmental technology leadership in Sri Lanka is the most valuable of US-AEP legacies.

WHAT WAS LEARNED

Use Partnerships to Leverage Additional Resources

In working to leverage the program's available assistance tools, US-AEP/Sri Lanka maintained close contact with other international donors, key environmental policy makers, NGOs, and private sector stakeholders. This was done through informal and formal contacts, including US-AEP representation on environmental group advisory committees, e.g., the Sri Lanka National Cleaner Production Centre and Global Environment Fund (GEF) Small Grant Program. US-AEP also maintained good relationships with other donors such as the World Bank, Asia Development Bank (ADB), and AusAID.

These relationships provided meaningful access to all parts of the environmental "world" in Sri Lanka, and allowed US-AEP to strategically complement many activities initiated by others and foster the development of joint assistance programs. By maximizing resources, reducing duplication, and allowing for wider coverage, this cooperation also allowed greater flexibility to cover a range of objectives and projects that would not have been possible if US-AEP had worked independently.

Close interaction with these key players also assisted in leveraging other USAID resources. Notably, the US-AEP "partnership mentality" and established connections with the private sector helped to quickly mobilize the USAID/Sri Lanka mission to tap newly available USAID Global Development Alliance (GDA) funds.

Leveraging private sector contributions to project implementation also grew over the years and helped to stretch the USAID dollar.

Make the Most of Regional Liaisons

Asia's industrializing economies face a myriad of similar environmental challenges. By interacting with its regional neighbors, Sri Lanka has the opportunity to learn from other countries' environmental management experiences and leapfrog forward in its own efforts. Being a regional program, US-AEP was in a unique position to identify important commonalities and help Sri Lanka tap regional expertise.

US-AEP staff and partners met annually to share work plans previewing the year's upcoming activities. These meetings and other regional communication facilitated by the program (e.g., the US-AEP website) helped identify common concerns and led to the design of inter-regional support. US-AEP regional cooperation also facilitated the initiation of activities in collaboration with other regional donor programs. A prime example was cooperation with the ADB on the Clean Air Initiative for Asian Cities.

US-AEP regional interactions catalyzed many important advances in environmental management efforts in Sri Lanka and helped foster lasting regional partnerships—relationships that should continue benefiting regional environmental professionals for years to come.

Influence Sri Lanka's Next Generation

Reaching environmental compliance targets, greening industries, and establishing sustainable livelihoods requires civic consciousness and action. The public needs to better understand the linkages between human actions and environmental degradation. By involving people in activities that demonstrate these linkages, offer solutions and alternatives, and highlight health and economic benefits to their own lives, one can change habits and build support for better environmental stewardship. Improved public awareness also helps to engage politicians and decision makers.

To foster environmental stewardship, US-AEP worked to enhance awareness with programs supporting hands-on, science-based, interactive, and fun learning activities involving actual restoration or management of natural resources. As children can effectively influence their parents and society at large and will continue to be environmental stewards into the future, several US-AEP supported activities engaged school children in learning about environmental problems and applying interventions to mitigate pollution. The goal was not only to increase awareness but also to make children understand that they can take action and influence others.

Along with programs for school children, US-AEP invested in improving the knowledge and skills of university students in environmental management. Activities included topics like cleaner production and also provided students with opportunities to intern with relevant organizations.

Use Trade Partnerships to Benefit Environmental Management

Providing services through private sector investment is a proven sustainable mechanism. However, creating an enabling environment for the private sector to participate in service delivery is challenging and often needs support.

Several US-AEP/Sri Lanka efforts helped to develop local and international trade and investment opportunities leading to better environmental management. Certain technologies and processes tested and used in developed countries were identified to address environmental problems in Sri Lanka. US-AEP efforts in technology identification and transfer led to a win-win situation for both the technology provider and the user. Having a flexible set of tools, such as technology promotion grants and exchanges, helped to promote initial trade contacts and demonstrate applications before finalization of trade deals.

EDUCATING TOMORROW'S ENVIRONMENTAL CHAMPIONS

Global Learning and Observations to Benefit the Environment (GLOBE) is a hands-on education program that unites students, teachers, and scientists from around the world to research the Earth's environment. US-AEP helped launch GLOBE in Sri Lanka through support of the program's first national teacher training – an example of US-AEP's commitment to educating Asia's future environmental leaders.

MOVING FORWARD WITH THE PARTNERSHIP APPROACH

The ten years of programmatic experience accumulated by the US-AEP/Sri Lanka team argues well for the benefits of promoting international public-private development partnerships—a model being carried forward by the USAID Global Development Alliance. While successfully applying this model is seen to be part art, part science and managing the multiple relationships involved is difficult, an effective strategic approach has been demonstrated.

The US-AEP strategic approach has had considerable success in creating partnerships that have resulted in significant environmental improvements in Sri Lanka by carefully:

- discerning local short- and mid-term needs,
- selecting and developing suitable partners to address these needs, and
- using flexible program "tools" sequentially to promote partnerships.

US-AEP impacts also have a strong chance of being sustainable in the long term. A particularly important element of this potential for sustainability has been the creation of future leaders among Sri Lankan environmental professionals. Through partnership interactions, a variety of individuals and organizations have developed the ability to critically analyze problems and potential solutions and cooperate effectively with others to implement them.

The US-AEP program comes to an end but will leave behind a wealth of knowledge and training, numerous models for replication and innovative partnership building experiences that can continue to be a source of inspiration and information to many future and on-going efforts on environmental management.

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