



USAID
FROM THE AMERICAN PEOPLE



PROGRESS REPORT

ASEAN Initiative on Environmentally Sustainable Cities (ESC)
Implementing the ESC Clean Water Framework

In Cooperation with
ECO-Asia Water and Sanitation Program



PROGRESS REPORT

ASEAN Initiative on Environmentally Sustainable Cities (ESC) *Implementing the ESC Clean Water Framework*

**In Cooperation with
ECO-Asia Water and Sanitation Program**

July 2008

DISCLAIMER

The United States Agency for International Development (USAID) funded the publication of the report. AECOM International Development provided assistance under USAID contract number 486-C-00-05-00010-00. The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

ACRONYMS

ADB	Asian Development Bank
ADFIAP	Association of Development Financing Institutions in Asia and the Pacific
AIESC	ASEAN Initiative on Environmentally Sustainable Cities
ASEAN	Association of Southeast Asian Nations
AWGESC	ASEAN Working Group on Environmentally Sustainable Cities
BMA	Bangkok Metropolitan Administration
CBO	Community-Based Organization
CfD	Center for Development
CPC	City People's Committee, Vietnam
ECO-Asia	Environmental Cooperation-Asia
ESC	Environmentally Sustainable Cities
GWP	Global Water Partnership
IWA	International Water Association
IWK	Indah Water Konsortium, Malaysia
LGA	Local Government Authority
LINAW	Local Initiative for Affordable Wastewater Treatment
MDGs	Millennium Development Goals
NGO	Non-Governmental Organization
O&M	Operations and Maintenance
PPWSA	Phnom Penh Water Supply Authority
PUB	Public Utilities Board, Singapore
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNICEF	United Nations Children's Fund
URENCO	Ha Long Urban Environmental Sanitation Company
USAID	United States Agency for International Development
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization
WMA	Wastewater Management Authority, Thailand
WOP	Water Operator Partnership
WSP	Water Safety Plan

TABLE OF CONTENTS

ACRONYMS	iii
SUMMARY	vii
INTRODUCTION	1
1. BACKGROUND	3
2. SURVEY FINDINGS.....	5
Survey Background and Methodology	5
Survey Findings.....	5
Survey Conclusions.....	7
3. WORKSHOP SUMMARY	8
Improving Water Supply and Sanitation Services Delivery	8
Innovative Strategies for Connecting Urban Poor Communities.....	9
Ensuring Sustainable Sanitation Services.....	10
Mobilizing Innovative Financing Mechanisms.....	12
Linking Sustainable Cities: City-to-City Partnerships	12
4. REGIONAL ACTION AGENDA.....	14
5. TWINNING PARTNERSHIPS.....	18
ANNEX A: ESC Clean Water Framework.....	23
ANNEX B: Profiles of Participating ESC Member Cities.....	26
ANNEX C: Workshop Participants.....	34

LIST OF TABLES

Table 1: Water and Sanitation Coverage for Urban Populations of ASEAN Countries (2004)	3
Table 2: ASEAN Environmentally Sustainable Cities	4
Table 3: Sanitation Service Area Coverage as Reported by Survey Respondents.....	6
Table 4: Regional Action Agenda	17

SUMMARY

The Environmental Cooperation-Asia (ECO-Asia) Water and Sanitation Program of the United States Agency for International Development (USAID) collaborates with the Association of Southeast Asian Nations (ASEAN) Working Group on Environmentally Sustainable Cities (AWGESC) to support implementation of the Environmentally Sustainable Cities (ESC) Clean Water Framework and to promote achievement of the Millennium Development Goals (MDGs).

During 2007 and 2008, ECO-Asia cooperation included: (1) conducting a rapid survey to collect information on water supply and sanitation from member cities; (2) organizing a regional workshop to confirm and elaborate findings; and (3) developing city-to-city "twinning" partnerships to facilitate sharing of best practices and promote improved access to water and sanitation in selected cities.

Despite differences in population, institutional arrangements, and service models among the participating ESC cities, the survey results revealed certain commonalities, including:

- Water supply coverage is generally high;
- Wastewater management is a mix of centralized systems and septic tanks;
- Every city has a city development strategy or a master development plan; and
- Most cities implement hygiene promotion programs.

Participating ESC member cities identified the three top priorities for water supply as

- Improving operational efficiencies of water supply (e.g., reduce non-revenue water, enhance billing and collection, and expand customer outreach);
- Extending water supply services to priority areas, including urban slums; and
- Improving the quality of water supply to protect public health.

For sanitation, the top three priorities included:

- Raising user and community awareness of the importance of sanitation;
- Developing a hygiene improvement program; and
- Developing or improving implementation of a septage management program.

On September 25-26, 2007 in Bangkok, ECO-Asia and ASEAN co-organized a regional workshop hosted by the Bangkok Metropolitan Administration to discuss survey findings, and develop a regional strategy on water and sanitation. At the workshop, ECO-Asia invited practitioners to share experience that highlighted key elements of the ESC Clean Water Framework, and facilitated a practitioner-to-practitioner exchange of knowledge and best practices to identify key implementation strategies.

The outcomes of workshop discussions linked closely with the results of the rapid survey: Delivering water to the urban poor and addressing water quality were top priorities, along with increasing awareness for sanitation services and developing standards for sanitation management, particularly septage management.

Member city discussions confirmed that ASEAN cities face common institutional, technical, and financial challenges and constraints in delivering urban water supply and sanitation services. Many cities suffer from poorly functioning systems due to insufficient investments in system development and operations, and limitations in human and institutional capacity.

For water supply, several cities reported high service coverage rates, and as a result face challenges in improving service delivery and expanding services to unserved poor residents. For sanitation, which typically has relatively lower service coverage as compared to water supply, challenges relate to the development or significant expansion of sanitation management solutions. Moreover, policymakers and communities do not fully appreciate the need to improve sanitation management, which leads to a low demand for services, low community willingness-to-pay, and inadequate (or in some cases non-existent) tariff structures.

For each of the identified challenges, participants proposed solutions and possible actions, as detailed in Table 4, which constitutes a regional action agenda (see below). Of the proposed solutions, there were three cross-cutting areas that apply to both water and sanitation: (1) raising awareness; (2) promoting good governance; and (3) facilitating regional cooperation.

In 2007 and 2008, in addition to working with the ASEAN ESC Initiative on developing a meaningful regional strategy and promoting regional exchange, ECO-Asia facilitated the development of “twinning” partnerships between counterpart cities or utilities to demonstrate effective strategies for improving access to water and sanitation. (ECO-Asia is a pioneer in Asia in developing twinning partnerships in line with the Hashimoto Action Plan developed at the Third World Water Forum.)

In particular, ECO-Asia established linkages between: (1) Indah Water Konsortium, which operates in Putrajaya, Malaysia, and Ha Long Urban Environmental Company in Vietnam on strengthening wastewater management services delivery; (2) Iloilo, Philippines and Phnom Penh, Cambodia on community-based sanitation and health; and (3) King County, USA, and the Wastewater Management Authority of Thailand and Krabi, Thailand on optimizing wastewater system operations and maintenance.

During 2009, ECO-Asia will continue to identify opportunities to facilitate twinning partnerships in part through a competitive, small grants program that will enable development of new twinning arrangements between ASEAN Environmentally Sustainable Cities and/or their water and wastewater service providers. ASEAN Environmentally Sustainable Cities and their water and wastewater service providers and related partners may apply for an ECO-Asia small grant, except for cities and partners in countries that are not eligible for USAID assistance. ECO-Asia grants will facilitate the adoption of best practices and innovative solutions that enable: (1) water services delivery to the poor; (2) sustainable sanitation solutions; (3) utility performance improvements; and (4) innovative financing.

INTRODUCTION

The United States Agency for International Development (USAID) works worldwide to support the achievement of the Millennium Development Goals (MDGs) by promoting improved access to sustainable water and sanitation services. In Asia, the USAID Environmental Cooperation-Asia (ECO-Asia) Water and Sanitation Program pilots and disseminates innovative strategies in four program areas:

- (1) Enabling water services delivery to the urban poor;
- (2) Demonstrating sustainable sanitation solutions;
- (3) Improving performance of water services utilities, and;
- (4) Enabling access to finance for water services.

ECO-Asia partners with local and national governments, water utilities, civil society groups, and financing institutions to develop institutional, technical, and financial solutions, and also collaborates with regional organizations and networks to facilitate replication of model solutions and best practices.

ECO-Asia supports implementation of the Paul Simon Water for the Poor Act, which requires the U.S. Department of State, in consultation with USAID and other U.S. Government agencies, to develop strategies and programs “to provide affordable and equitable access to safe water and sanitation in developing countries” within the context of sound water management.¹ The Act calls for the implementation of activities that provide affordable and equitable access to safe water and sanitation in developing countries. The Act also supports partnership and coordination with other organizations working to improve safe water and sanitation access.

“The United States Government is committed to promoting improved access to safe water and sanitation for developing countries...and supports achievement of Target 10 of the Millennium Development Goals. One principal partner for USAID in this effort is ASEAN. With funding from the United States Department of State, USAID has joined hands with ASEAN and cities in the region to improve access to water and sanitation through city linkages under the ASEAN Initiative on Environmentally Sustainable Cities. In our experience, sharing ideas, information and innovation between peers is an effective means for catalyzing positive change.”

**His Excellency Ralph Boyce
U.S. Ambassador to Thailand**

The Association of Southeast Asian Nations (ASEAN) promotes sustainable development through ASEAN Vision 2020, which aims to protect the environment and ensure a high quality of life in ASEAN cities. To help achieve its Vision 2020, ASEAN launched the ASEAN Initiative on Environmentally Sustainable Cities (AIESC) to address air, land, and water challenges.²

ECO-Asia collaborates with the ASEAN Working Group on Environmentally Sustainable Cities (AWGESC) to support implementation of the ESC Clean Water Framework (see Annex A). To provide a basis for cooperation, ECO-Asia conducted a rapid survey to collect information on water supply and sanitation from member cities. On September 25-26, 2007 in Bangkok, ECO-Asia and ASEAN co-organized a regional workshop hosted by the Bangkok Metropolitan Administration to discuss survey findings, and develop a regional strategy for improving water and sanitation.

¹ Paul Simon Water for the Poor Act (<http://www.state.gov/g/oes/water/>)

² ASEAN Environmentally Sustainable Cities (<http://www.aseansec.org/14544-c.htm>).

The workshop objectives were to:

- Present rapid survey findings on the water supply and sanitation;
- Share best practices and innovative models for improving water supply and sanitation services delivery in support of the ESC Clean Water Framework;
- Develop a regional strategy by identifying common challenges and priority solutions of the member cities; and
- Identify opportunities for cooperation and knowledge transfer between cities.

In support of the ESC Initiative and implementation of the regional strategy, ECO-Asia also supports demonstration projects and city-to-city “twinning” arrangements with selected member cities. For example, in Phnom Penh, Cambodia, ECO-Asia facilitated an innovative participatory planning process to develop strategic interventions for addressing water and sanitation challenges. As part of this effort, ECO-Asia facilitated a twinning linkage between Phnom Penh with Iloilo City in the Philippines on raising awareness of sanitation and hygiene. In Halong, Vietnam, ECO-Asia linked the Halong Urban Environmental Company with Indah Water Konsortium, a Malaysian utility, to strengthen the Halong’s capacity for effectively operating its wastewater treatment plants.

Report Outline

This report provides a summary of the survey findings, workshop outcomes, and results of pilot demonstration projects with ASEAN cities.

1. Background

Provides context for the rapid survey and regional workshop, including the Millennium Development Goals, and USAID’s and ASEAN’s commitment toward promoting environmental sustainability.

2. Survey Findings

Provides a summary of rapid survey methodology and findings, including key priorities of water supply and sanitation in ESC.

3. Workshop Summary

Presents summaries of workshop presentations of best practices to support the implementation of the ESC Clean Water Framework.

4. Regional Action Agenda

Identifies common challenges and solutions related to water supply and sanitation services delivery, as developed by workshop participants.

5. Twinning Partnerships

Summarizes activities and outcomes of twinning partnerships developed by ECO-Asia in support of the regional action agenda.

I. BACKGROUND

In Asia, nearly 644 million people are without access to safe drinking water supply. In Asian cities, an estimated 84 million people do not have access to safe drinking water and 255 million people lack basic sanitation. In 2000, 14.3 percent of Asian children under the age of five died due to diarrheal diseases.³ Due to rapid urbanization, this situation is likely to worsen over the next two decades, as more than half the people living in Asia will reside in urban areas by 2030.

MILLENNIUM DEVELOPMENT GOALS

Adopted by world leaders in 2000, the Millennium Development Goals (MDGs) are a set of time-bound and measurable goals and targets for reducing poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women.⁴ Water supply and sanitation improvements are essential in addressing poverty, and Target 10 of Goal 7 specifically aims at reducing by half the proportion of people without sustainable access to safe drinking water and improved sanitation by 2015.

Water Supply and Sanitation and Southeast Asia

According to a 2004 report by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), compared to other Asian regions, Southeast Asia has a relatively high percentage of people served with water supply, but a low percentage of people whose access is through a house connection.⁵ Roughly two-thirds of Southeast Asians have access to sanitation services, which is relatively higher than those living in East Asia and South Asia.

Household sewer connections, however, are lowest in Southeast Asia as compared with other Asian sub-regions. Wastewater usually goes to a septic tank, drainage channel, or directly into natural bodies of water or onto land, which poses public health risks caused by contaminated water supplies.

To provide some regional context, Table I provides a summary of MDG water and sanitation coverage information on a country basis for ASEAN member countries.

Table I: Water and Sanitation Coverage for Urban Populations of ASEAN Countries (2004)

Country	Population		Improved Drinking Water Coverage			Improved Sanitation Coverage	
	Total (millions)	Urban (%)	Total Population (%)	Urban (%)	Urban with HC* (%)	Total Population (%)	Urban (%)
Brunei	0.4	77%	No data reported for Brunei				
Cambodia	13.8	19%	41%	64%	36%	17%	53%
Indonesia	220.1	47%	77%	87%	30%	55%	73%
Lao PDR	5.8	21%	51%	79%	44%	30%	67%
Malaysia	24.9	64%	99%	100%	98%	94%	95%
Myanmar	50.0	30%	78%	80%	16%	77%	88%
Philippines	81.6	62%	85%	87%	58%	72%	80%
Singapore	4.3	100%	100%	100%	100%	100%	100%
Thailand	63.7	32%	99%	99%	85%	99%	98%
Viet Nam	83.1	26%	85%	99%	73%	61%	92%

*HC = House Connection, Source: JMP MDG Goals 2006 Report

³ Based on ADB Water Knowledge Center statistics at <http://www.adb.org/water/indicators/cwsi-all-country-profile.asp?title=Deaths-Child-D&Submit=GO>

⁴ Millennium Development Goals (<http://www.un.org/millenniumgoals/>)

⁵ WHO & UNICEF Joint Monitoring Program for Water Supply & Sanitation (<http://www.wssinfo.org/en/welcome.html>)

As this information indicates, in four of the ten ASEAN countries, over half of the population is urban, which has greater access to improved water and sanitation than rural populations. In another four countries, 99 to 100 percent of the urban population has access to improved water sources. Most countries have improved urban sanitation coverage above 70 percent

ASEAN Initiative on Environmentally Sustainable Cities

While ASEAN cities have put in place programs to improve their environmental performance, increasing urbanization, industrialization, and economic growth place significant pressures on the environment and quality of life. In 2003, in support of the ASEAN Vision 2020, the ASEAN Environment Ministers established the ASEAN Working Group on Environmentally Sustainable Cities (AWGESC) to address environmental challenges faced by ASEAN cities.⁶

The AWGESC is responsible for developing strategies and programs to realize the vision of ASEAN sustainable cities. One of its creations is a Framework for ESC to address clean air, clean water, and clean land. As one element of the Framework, member cities are working to increase the accessibility and sustainability of water supply and sanitation services. Key activities include identifying priority water supply and sanitation challenges, supporting pilot projects with member cities, sharing best practices, and promoting regional cooperation.

To operationalize the Framework, the AWGESC established the ASEAN Initiative on Environmentally Sustainable Cities (AIESC), which places a greater environmental emphasis on ongoing or planned city development plans. ASEAN environment ministers nominated 24 cities in their respective countries to participate in AIESC and implement the Framework. Table 2 lists the participating cities. Annex A provides details the AIESC Clean Water Framework.

Table 2: ASEAN Environmentally Sustainable Cities

	City	Country		City	Country
1.	Bandar Seri Begawan	Brunei	13.	Yangon	Myanmar
2.	Phnom Penh	Cambodia	14.	Cagayon de Oro	Philippines
3.	Siem Reap		15.	Quezon	
4.	Balikpapan	Indonesia	16.	Iloilo	
5.	Medan		17.	Singapore	Singapore
6.	Denpasar		18.	Bangkok	Thailand
7.	Luang Prabang	19.	Chiang Mai		
8.	Vientiane	20.	Krabi		
9.	Sayaboury	Lao PDR	21.	Phuket	Vietnam
10.	Kuantan	Malaysia	22.	Da Nang	
11.	Putrajaya		23.	Ha Noi	
12.	Mandalay	Myanmar	24.	Ha Long	

Source: The ASEAN Secretariat (http://www.aseansec.org/cities_list.htm)

⁶ ASEAN Vision 2020 calls for a "clean and green ASEAN with fully established mechanisms for sustainable development to ensure the protection of the region's environment, the sustainability of its natural resources, and the high quality of life of its peoples."

2. SURVEY FINDINGS

SURVEY BACKGROUND AND METHODOLOGY

ECO-Asia prepared a rapid survey and worked with ASEAN to send the survey questionnaires to AIESC cities. Once completed, ECO-Asia reviewed and analyzed the results. The main objectives of the rapid survey were to:

- Gather city data on coverage areas;
- Collect information on service coverage, delivery and responsibilities; and,
- Identify priority areas for strengthening water supply and sanitation service delivery.

SURVEY FINDINGS

City Information

Nineteen of the 24 cities in nine of the 10 ASEAN member countries completed surveys (cities not responding were Mandalay and Yangon in Myanmar, Cagayon de Oro and Quezon in the Philippines, and Danang in Vietnam). Participating cities included six national capital cities and ten provincial capital cities. The populations of these cities ranged from 24,000 people (Sayaboury, Laos) to 5,700,000 people (Bangkok). Five cities have a population exceeding one million, and five have a population of less than 100,000 people. Annex B provides brief profiles of ASEAN Environmentally Sustainable Cities.

Water Supply

Service Delivery. Five of the 19 cities that responded to the survey have 100 percent service area coverage for water supply (i.e., Bandar Seri Begawan, Putrajaya, Singapore, Chiang Mai, and Krabi), while another five reach greater than 80 percent. Three cities, however, reported less than 50 percent service coverage (i.e., Siem Reap, Balikpapan, and Luang Prabang).

Fifteen of 19 participating cities provide continuous water service. (Cities not reporting continuous supply are: Ha Long, Ha Noi, Iloilo and Luang Prabang. A continuous water supply can better protect human health by preventing groundwater infiltration into pipes, a situation commonly experienced under intermittent supply conditions.

In 11 of the 19 cities, some residents rely on water vendors and trucked water. Although water supplied from these sources is generally clean, it still requires disinfection before drinking or cooking.

For raw water sources, nine cities use surface water exclusively and two use only groundwater (Siem Reap and Ha Noi), while the other eight cities use both. Generally, groundwater requires only disinfection before use, whereas surface water must be filtered before disinfection. Groundwater can become contaminated, however, when there is incomplete or inadequate wastewater collection and disposal. In this respect groundwater needs to be treated in the same manner as surface water.

Five cities (i.e., Phnom Penh, Siem Reap, Luang Prabang, Singapore and Vientiane) report that drinking water directly from the tap is safe. This generally means that the water is treated and disinfected before it enters the distribution system, and laboratory analysis confirms water quality.

Institutional Arrangements. Only eight of the 19 cities are served by a water company under the control of city authorities. In seven cities, water is provided by a national-level organization, and in four cities, the water provider is a provincial-level organization. In Brunei, the Department of Water Services of the Ministry of Development provides water in Bandar Seri Begawan, while in Cambodia the water companies are part of the national Ministry of Mines, Industry, and Energy serving Phnom Penh and Siem Reap. The Phnom Penh Water Supply Authority is relatively autonomous in its service delivery. In Thailand, the Metropolitan Waterworks Authority serves Bangkok and its two surrounding provinces, while the Provincial Waterworks Authority supplies water to most of the rest of the country including

Chiang Mai, Krabi, and Phuket. In Medan, Indonesia, and in the three Laotian cities, Luang Prabang, Sayaboury, and Vientiane, the water company is a provincial organization.

Each institutional model – city, provincial, or national agency – has advantages and disadvantages. Service by an external agency can enable the city to focus more resources on other priorities, but can lead to challenges in directing and coordinating service expansions or improvements.

City Priorities. According to survey responses, the three top priorities for water supply are:

- Improving operational efficiencies of water supply (e.g., reduce non-revenue water, enhance billing and collection, and expand customer outreach);
- Extending water supply services to priority areas, including urban slums; and
- Improving the quality of water supply to protect public health.

These issues are priorities for both the ASEAN Clean Water Framework and ECO-Asia Water and Sanitation Program, and provide a basis for collaboration. Most cities did not identify financing water supply expansion or improvements as a priority, perhaps because funding generally comes from the national or provincial government.

Sanitation

Service Delivery. As shown in Table 1, water supply coverage throughout Asia is much higher than sanitation coverage. In 2004, 82 percent of people in Asia had access to safe water supply while less than half the people (47 percent) had access to adequate sanitation.⁷ Four of the 19 ESC (Bandar Seri Begawan, Putrajaya, Singapore, and Phuket) report 100 percent service area coverage for sanitation services. Seven cities report between 50 and 99 percent coverage, while eight cities show less than 50 percent coverage (see Table 3 below).

Table 3: Sanitation Service Area Coverage as Reported by Survey Respondents

100% coverage	50-99% coverage	Less than 50% coverage
1. Bandar Seri Begawan	5. Siem Reap	12. Phnom Penh
2. Phuket	6. Kuantan	13. Balikpapan
3. Putrajaya	7. Bangkok	14. Medan
4. Singapore	8. Chiang Mai	15. Denpasar
	9. Ha Long	16. Luang Prabang
	10. Sayaboury	17. Vientiane
	11. Iloilo	18. Krabi
		19. Hanoi

Fifteen of the 19 cities report having centralized wastewater collection and treatment system. (The four cities not reporting centralized collection and/or treatment systems are: Iloilo, Siem Reap, Luang Prabang and Sayaboury.) In some cities, for example Phnom Penh, there is a wastewater collection system but no treatment system. Of the four cities without centralized collection and treatment, Iloilo currently uses septic tanks, and the remaining three cities report having neither centralized collection and treatment systems, nor septic tanks.

The majority of these cities also use septic tanks in addition to having centralized systems. For instance, 13 of the 15 cities that use septic tanks also implement septage management programs, which set the standards for septic tanks and septage collection and disposal. In two cities, a separate agency provides this service (e.g., in Putrajaya). The survey questionnaire focused on services provision, and did not address the effectiveness of wastewater collection and treatment. For example, septic tanks without solid bottoms allow wastes to contaminate groundwater, which in turn may endanger public health.

⁷ Meeting the MDG Drinking Water and Sanitation Target: The Urban and Rural Challenge of the Decade", World Health Organization and UNICEF, 2006 (http://www.wssinfo.org/en/40_MDG2006.html).

Only eight of the cities charge residents for wastewater services. One reason for this low number is the difficulty coordinating with external water service providers, such as provincial or national agencies, in billing for wastewater services. Another is the customers' low willingness-to-pay, which may stem from a general lack of awareness regarding the importance of effective sanitation.

City Priorities. According to the survey, the top three priorities for sanitation management services are:

- Raising user and community awareness of the importance of sanitation;
- Developing a hygiene improvement program; and
- Developing or improving implementation of a septage management program.

Fourteen of the 19 ESC listed raising user and community awareness as a priority. This reflects the need to inform and educate the public and elected officials about the necessity of sanitation management, including adequate wastewater collection, treatment, and disposal.

Health and Hygiene

Every respondent reported that a city-, provincial-, or national-level agency monitors the health of its population. Most cities (15 out of 19) report hygiene programs to protect public health, but only 12 of these programs target primary and secondary schools. Experience elsewhere shows the public health advantages of providing instruction in schools about hand washing and personal hygiene.

SURVEY CONCLUSIONS

Despite differences in population, institutional arrangements, and service models among the participating cities, certain commonalities emerge:

- Water supply coverage is generally high;
- Wastewater management is a mix of centralized systems and septic tanks;
- Every city has a city development strategy or a master development plan; and
- Most cities implement hygiene promotion programs.

Responses to this survey reveal that financing for water supply expansions is not a high priority among the majority of participating cities, probably as a result of how services are provided. In 11 of the 19 cities, water supply is provided by an external agency, either at the national or provincial level. As a result, funding for expansions is dependent on decisions taken by the national or provincial government.

The survey results indicate that improving operational efficiencies is the highest priority for water services. To improve sanitation services delivery, increasing city residents' awareness regarding the importance and need for wastewater collection, treatment, and disposal is the most critical.

Lastly, the survey results show that city priorities for water and wastewater are in line with the AIESC Clean Water Framework and ECO-Asia programming, thus reaffirming their objectives.

3. WORKSHOP SUMMARY

ECO-Asia and ASEAN co-organized a regional workshop on September 25-26, 2007, in Bangkok to share the survey findings, discuss common challenges of delivering water supply and sanitation services, and develop strategies to address the challenges. Hosted by the Bangkok Metropolitan Administration (BMA), the workshop also showcased best practices that cities could adopt and adapt.

To address challenges in improving operational efficiencies, strengthening customer relations, and enhancing water quality, the AIESC Clean Water Framework identifies strategies and actions that focus on developing appropriate water quality management systems, sharing best practices on efficiency improvements, and building human and organizational capacities (see Annex A).

At the workshop, ECO-Asia invited resources persons to share experience that highlighted key elements of the ESC Clean Water Framework, and facilitated a practitioner-to-practitioner exchange of knowledge and best practices to identify key implementation strategies. As detailed below, managers and practitioners shared their experience on overcoming a variety of constraints through presentations and discussions.

Workshop Best Practices that Highlight ESC Clean Water Framework Objectives

Objective 1: To achieve good accessibility and quality of water supply for ASEAN cities

- Singapore introduced its integrated water quality management plan to showcase how water quality is monitored from the source to the tap.
- The International Water Association, China presented the Water Safety Plan as a management tool that utilities and cities could prepare and implement to recognize and address the many threats to drinking water quality from water catchments to consumers.
- Medan, Indonesia highlighted its water supply scheme for the urban poor to increase accessibility through the use of a bulk meter and community-managed distribution network.

Objective 2: To protect water resources, safeguard ecosystems, and public health so as to achieve ASEAN water quality standards

- Bangkok, Thailand presented its wastewater management approaches to highlight the importance of proper urban planning and public participation in safeguarding public health
- Phnom Penh, Cambodia presented plans to develop strategy for wastewater management and hygiene promotion.

Objective 3: To move toward sustainable supply and use of water

- Sayabouly, Lao PDR highlighted its plans to expand services to the poor and increase accessibility by providing piped water, introducing revolving funds for water connections and latrine constructions, and involving relevant communities in the system development process.
- Phnom Penh, Cambodia reported on its service delivery strategies for the urban poor that include reaching out to poor communities and establishing pro-poor policies, such as connection fee payments in installments.
- The Association of Development Financing Institutions in Asia and the Pacific (ADFIAP) presented the loan options for service providers to seek funding to improve their services delivery.

Objective 4: To promote environmental responsibility and ownership

- Iloilo City, Philippines showcased its public outreach activities to raise awareness of sanitation and encourage user-pay schemes for sanitation services.
- Indah Water Konsortium, serving Putrajaya, Malaysia presented its customer outreach activities to increase understanding of sanitation services and promote demand for improved sanitation conditions.

Water Quality Monitoring and Assurance

Mr. Haja Nazarudeen, Assistant Director, Public Utilities Board (PUB), Singapore

Through its integrated water quality management plan, Singapore's Public Utilities Board (PUB) ensures that source water can be treated for drinking, and maintains a high level of public confidence in its water quality. PUB applies the multi-barrier concept of water treatment and safeguards the quality of its source water through strict enforcement, pollution prevention, and frequent monitoring. For the distribution system, PUB exercises a comprehensive water quality monitoring program, testing approximately 300 parameters above the 116 recommended by the World Health Organization (WHO). On a monthly basis, PUB collects and analyzes an average of 19,000 samples through 80,000 tests. It also implements an innovative program called the Fish Activity Monitoring System to evaluate water quality. On the consumer side, PUB maintains water quality by licensing water service plumbers and setting standards and requirements for interior water fittings. PUB's integrated plan extends from water catchment to the customer's tap.

Customer Relations and Capacity Building

Mr. Mohd Zainal Zakaria, Regional Operations Manager, Indah Water Konsortium (IWK), Malaysia

Indah Water Konsortium (IWK) provides sewerage services to over 22 million users in 86 local councils, including Putrajaya, in 10 states in Malaysia. IWK operates and maintains public sewage treatment plants and sewer networks, and provides scheduled septic tank desludging services. IWK has a Customer Charter that outlines their commitment to provide efficient sewerage services to fulfill customer expectations. IWK also has a regular community outreach program and operates an effective customer complaint management system to ensure that customers are satisfied, and thus are willing to pay for services. It has also created key performance indicators for operations and customer service. Finally, IWK has developed a training center and program to strengthen the capacity of its staff in managing sanitation services.

Water Safety Plans

Ms. Rose Xiaowei Lang, Director, International Water Association (China)

The Water Safety Plan (WSP) is a comprehensive management tool to identify, assess, monitor, and manage risks inherent in a water delivery system from catchment to tap. The WSP uses a systematic, preventive approach rather than a reactive approach to problem solving by identifying all points in the drinking water system where contamination could compromise the water reaching consumers. It is a robust approach that recognizes the many threats to drinking water quality, provides for daily responses to changing physical circumstances, and adapts to changing regulations. Key components of the plan include a supply system assessment, effective operational monitoring, and management. It also calls for engaging multi-stakeholders, including the environment and health sectors, during plan preparation and implementation. WHO has prepared training and resource materials for developing the plan, and is currently working with the International Water Association's China office to test its implementation with service providers. WHO has also worked with other partners to pilot WSP development and implementation in Cambodia, Lao PDR, Philippines, and Vietnam.

INNOVATIVE STRATEGIES FOR CONNECTING URBAN POOR COMMUNITIES

Expanding Water Service to the Urban Poor: Phnom Penh's Experience

Dr. Chea Visoth, Assistant General Director, Phnom Penh Water Supply Authority, Cambodia

The Phnom Penh Water Supply Authority (PPWSA), an agency of the national Ministry of Mines, Industry, and Energy, aims to serve the urban poor by providing the same quality of service to all customers; to cross subsidize among users; to allow connection fee installment payments; and to provide subsidies using money from grants and social funds. PPWSA does not disconnect services even when people do not pay. Its policy addresses the common reasons why the urban poor are not served:

(1) service providers and governments giving a lower priority towards services for the poor; (2) high connection fees; and (3) high water costs.

Expanding Water Service to the Urban Poor: PDAM Tirtanadi, Indonesia

Mr. Zainal Abidin Siregar, Division Manager, PDAM Tirtanadi, Indonesia

PDAM Tirtanadi is located in Medan, the provincial capital, and provides water and wastewater services to North Sumatra province. PDAM Tirtanadi extends services to the poor because it has an obligation to provide service the entire population within the coverage area. For PDAM Tirtanadi, the usual house connection system faces challenges when applied to the urban poor. First, the scheme forces an official recognition of informal and illegal slum areas, which contradicts local regulations. Second, those locations are often not suitable for PDAM technical construction standards. Third, there are concerns about water loss, water theft, and problems with billing.

As a result, PDAM Tirtanadi devised a master meter scheme as an alternative connection option for the poor. In this approach, service is provided through a bulk meter and the community manages their own distribution networks, metering, and billing collection. Key stakeholders include the water provider, community, community-based organization (CBO), and a local NGO that assists with CBO establishment and training. The key principle is to respond to the community's needs and ensure safe water supply. The tariff from the meter is established on a case-by-case basis and ranges from a basic flat tariff to a standard progressive tariff with three elements: (1) the master meter bill; (2) operation and maintenance (O&M) for the community pipeline distribution network system; and (3) cost of the CBO operation.

Key activities for implementing the master meter scheme include the following:

- The NGO works with the community to develop the concept and establishes the CBO.
- PDAM Tirtanadi connects a bulk master meter.
- The CBO is responsible for developing a simple pipe network, collecting payments from each household, and paying a monthly bill to the PDAM.
- The CBO is also responsible for the O&M of the piped system after the master meter.

Community-based Water Supply and Sanitation Project, Sayabouly, Lao PDR

Mr. Vilack Silasack, Deputy Chief of Housing and Urban Planning Division, Sayaboury Province, Lao PDR

Sayabouri is planning a program to provide safe piped water to four low-income villages (3,800 people in 700 households) through the UN-Habitat Mekong Water and Sanitation program. The program will also reduce the burden on women and children in collecting water from the Nam Houng River. The program scope consists of three parts: (1) provision of safe piped water; (2) improved sanitation; and (3) enhanced capacity of the water supply enterprise. The program features pro-poor household connections and water tariff structures; revolving funds for water connections and latrine construction; and campaign to raise community awareness of sanitation.

ENSURING SUSTAINABLE SANITATION SERVICES

Best Practice on Sustainable Sanitation in Iloilo, Philippines

Mr. Noel Hechanova, Department Head, Iloilo City, Philippines

In Iloilo, many septic tanks are not properly constructed, and are not emptied until they overflow. Untreated effluent, therefore, flows into the public drainage system and surface water bodies. Under the USAID Local Initiative for Affordable Wastewater Treatment (LINAW) program, Iloilo piloted the application of small-scale, low-cost wastewater treatment systems through a participatory planning approach that involved government and consumers, as well as information sharing and public awareness campaigns that elevated the importance of sanitation.

Iloilo also successfully developed septic tank management programs, instituted decentralized treatment systems for the public market and slaughterhouse, and implemented the polluter pays principle. The program began by addressing publicly owned wastewater generators, which demonstrated Iloilo's commitment to reducing pollution and provided credibility when pushing the private sector to implement pollution control measures. Lessons learned from Iloilo are:

- Consulting and engaging stakeholders and local government ownership is important;
- Full cost recovery is feasible with low-cost technology and user fees; and
- Effective social marketing campaigns help build support and willingness-to-pay fees.

Urban Sanitation and Health Strategy in Russei Keo District, Phnom Penh, Cambodia

Mr. Mann Chhoeum, Vice Governor, Phnom Penh Municipality, Cambodia

The current situation in the Russei Keo District of Phnom Penh includes poor sanitation, insufficient water supply, lack of drainage systems, and improper solid waste management. These challenges endanger public health. In partnership with ECO-Asia, the Phnom Penh Municipality is developing a district-wide sanitation management strategy to improve wastewater collection treatment and promote better hygiene. It also plans to raise overall awareness and capacity of city officials in managing sanitation services.

To coordinate the activities, the Municipality and ECO-Asia organized a launching workshop to prepare a strategy for incorporating planning for sanitation improvements into an ongoing Five-Year Municipal Development and Investment Plan. The Municipality then conducted rapid environmental health surveys in 12 sub-districts, in which surveyors and local leaders assessed sanitation issues and discussed with residents. The Municipality then used survey results to prepare an environmental strategy for the sub-district Five-Year-Plan, reaching a consensus on the specific nature of the environmental health issues faced at the local level. To assist in these efforts, ECO-Asia facilitated a linkage with a counterpart from Iloilo City, Philippines, who shared that city's strategy for addressing its sanitation challenges.

"There are many challenges and problems that demand bold initiatives and a strong spirit of cooperation among developed and developing nations. We are well aware that solutions to the problems of water deterioration and providing improved access to water supply and sanitation can be found through enhanced international cooperation and coordination."

**Governor Apirak Kosayodhin
Bangkok Metropolitan Administration**

Wastewater Management in Bangkok

Mr. Chanchai Vitoonpanyakij, Deputy Director General, Bangkok Metropolitan Administration (BMA), Thailand

The Bangkok Metropolitan Administration (BMA) initiated a sewerage Master Plan in 1968 covering 370 square kilometers of the city. Subsequently, BMA revised the plan to cover larger areas and to include the reuse of wastewater sludge and treated effluent. BMA now operates and manages a combined sewer system that collects both human wastewater and rainwater. BMA also oversees seven major treatment plants and 12 community treatment plants throughout the city.

During the implementation of its Master Plan, BMA effectively engaged affected communities and beneficiaries of its wastewater management services. The public participated in the planning and development of treatment plant locations and collection systems. BMA conducted several surveys to identify the willingness-to-pay and ability to pay for services in several districts. BMA is currently planning to set appropriate charges based upon the surveys. Although residents are enjoying the benefits of improved sanitation services, BMA continues to review its plans as Bangkok grows.

MOBILIZING INNOVATIVE FINANCING MECHANISMS

To achieve the MDGs, investments in water and sanitation infrastructure will need to double. With the continuously growing demand for water, however, local water service financing is a challenge. Government subsidies are insufficient to meet the demands, and access to other financing schemes is hindered because repayment is difficult to guarantee. However, methods of financing water and sanitation projects without grants are feasible, for example, by debt financing such as loans and bonds. Other alternatives include increasing local revenues (through increased taxes or fees), private sector equity investments, and public-private partnerships.

In the Philippines, ECO-Asia piloted Efficiency Improvement Loans to improve the credit-worthiness of water utilities by facilitating investments in equipment, systems, and procedures to improve operational efficiencies such as reducing non-revenue water and energy consumption, and improving billing and collection. These improvements led to decreased operating costs, increased revenues, and thus an increased ability to service debt.

Understanding Bank Lending Aspects

Mr. Octavio B. Peralta, Secretary General, Association of Development Financing Institutions in Asia and the Pacific (ADFIAP)

The Association of Development Financing Institutions in Asia and the Pacific (ADFIAP), a 30-year-old association of development banks with 83 member banks in 37 countries and territories, has a sustainable development agenda that targets environmental, social, and economic improvements centered on institutional governance. ADFIAP presented information on how development banks can be a source of funding for cities for financing water supply and sanitation projects. ADFIAP recommends the following steps in approaching development banks:

- Prepare proper business plans;
- Improve governance standards;
- Learn more on equity financing; and
- Enhance linkages with other cities, banks, and business associations.

According to ADFIAP, development bank concerns on providing credit relate to measurement, protection, and collection. Measurement aspects include the five C's of Credit (Character, Capacity, Capital, Condition, and Collateral), which cities should consider in approaching development banks.

ADB's Water Financing Program: Helping Bridge the Financing Gap For Water in Asia and the Pacific

Mr. Rudolf Frauendorfer, Senior Urban Development Specialist, Asian Development Bank (ADB)

The situation in Asia and the Pacific is not so much a problem of water shortage, but rather of poor water governance and management. There is a need for integrated solutions, investment reform, capacity development, and better governance. ADB's water financing program from 2007-2009 includes \$2 billion per year and 25 percent of ADB's overall lending. These programs focus on infrastructure finance, reform and governance, and capacity development. The ADB Water Financing Partnership Facility supports new financing modalities that cities can access.

LINKING SUSTAINABLE CITIES: CITY-TO-CITY PARTNERSHIPS

To facilitate the sharing of best practices and knowledge transfer through regional cooperation, ECO-Asia presented information on "twinning" partnerships that link counterpart cities and utilities. In a twinning partnership, one partner typically shares innovative strategies and model solutions, and assists in the adoption of these best practices by the counterpart to achieve measurable results. While the partnership is between utilities or cities, the transfer of knowledge and best practices occurs between practitioners, resulting in its immediate application. ECO-Asia's principles of twinning are:

- Non-commercial engagement and cost-sharing (partners contribute time and resources);
- Sharing of new innovations, technology, and systems;
- Capacity building or mentoring elements; and
- Practitioner-to-practitioner exchange.

At the workshop, two practitioners shared their knowledge and experience to support partnerships and twinning.

Singapore Water Hub

Mr. Tan Ban Thong, Manager Water Hub, Public Utilities Board (PUB), Singapore

The Singapore PUB Water Hub is a platform that brings technology, learning, and networking under one roof for the water industry. PUB trains its 3,000 staff and supports development of the Singapore water industry. PUB also promotes research and development, shares technology, connects with international partners, and promotes technology partnerships. PUB's training programs include all aspects of water supply and wastewater treatment, and courses are accredited by the United States Association of Boards of Certification. PUB's Water Hub supports ASEAN by making its training and technology services available to water and wastewater utilities and government agencies.

Wastewater Management in King County, Washington State, United States

Mr. Randy Shuman, Science and Technical Support Manager, King County, Washington State, United States

King County serves 1.8 million people with wastewater treatment; solid waste management; land use planning, regulation, and management; flood hazard reduction; water supply planning; and public health services. The County also has an environmental laboratory with 70 staff that collects and analyzes samples.

King County manages wastewater systems, serving 33 local government agencies with a population of 1.2 million people in an area approximately 5,800 square kilometers. The regional conveyance system consists of 425 kilometers of pipes and numerous pump stations. Similar to Singapore, the County focuses on recycling and reuse. It is also constructing a membrane bio-reactor plant that will be the largest (by volume) in the world.

King County's public communications program informs people about services, costs, and obligations, and raises awareness about the environment and health. King County shares its experiences and approaches on reaching out to customers and policymakers, as well as on improving wastewater management systems.

4. REGIONAL ACTION AGENDA

The principal objective of the workshop was to develop a regional action agenda based on common challenges and solutions for improving water supply and sanitation service delivery in support of the ESC Clean Water Framework (see Annex A). Participants engaged in facilitated, small group discussions to identify and prioritize their challenges and constraints, and develop an action agenda comprised of recommended solutions and actions (see Table 4 below). Not surprisingly, the outcomes of workshop discussions link closely with the results of the rapid survey. Delivering water to the urban poor and addressing water quality were top priorities, along with increasing awareness for sanitation services and developing standards for sanitation management, particularly septage management.

PRIORITY CHALLENGES

Discussions on the challenges confirmed that ASEAN cities face common institutional, technical, and financial challenges and constraints in delivering urban water supply and sanitation services. Many cities suffer from poorly functioning systems due to insufficient investments in system development and operations, and limitations in human and institutional capacity. For water supply, several cities reported high service coverage rates, and as a result face challenges in improving service delivery and expanding services to unserved poor residents. For sanitation, since cities have relatively less service coverage as compared to water supply, challenges relate to the development or significant expansion of sanitation management solutions. Moreover, in the sanitation context, policymakers and communities do not fully appreciate the need to improve sanitation management, which leads to a low demand for services, low community willingness to pay, and inadequate (or in some cases non-existent) tariff structures.

Institutional

Participants identified similar institutional obstacles for water and sanitation, including limitations in political commitment and awareness by elected officials, legal and regulatory barriers, and weak human and institutional capacity. These obstacles can result in budgetary allocations far below the levels necessary to effectively improve service delivery. As a result, investments for new technologies and for building human and institutional remain limited, and tariff structures also do not support cost recovery. In addition, service expansion to underserved urban areas, especially the urban slums, remains restricted due to a misperception that the poor should not be considered reliable, paying customers. Cities also cited the need for improved sanitation management regulations, procedures and guidelines related to septage management, land use, and hygiene promotion.

Technical

According to city representatives, the technical challenges related to providing services depend on each city's particular service delivery scheme. For water supply, cities cited water quality and quantity as major impediments. In some cases, water supply service providers are facing degrading raw water quality and dwindling water resources. Water quality in the distribution network can also require monitoring, since aging pipes cause leakages that allow infiltration of pollutants. As to sanitation, cities are facing technical challenges related to weak standards, but also face difficulties in identifying available land for treatment systems in highly urbanized areas.

Financial

According to city representatives, expanding water and sanitation services is a significant challenge, since operating revenues are often insufficient, due to low tariffs and relatively high costs brought about by inefficient operations. In some cases, governmental subsidies are not sufficient to finance investments, and often service providers cannot borrow from international development banks, due in part to constraints imposed by national governments or bank policies. Domestic banks also typically offer credit at expensive rates and with conditions that most utilities cannot meet. In any case, chronic revenue shortfalls impact utilities' ability to repay debt.

PROPOSED SOLUTIONS

For each of the identified challenges, participants proposed solutions and possible actions, as detailed in Table 4 (below). Of these proposed solutions, however, there were three cross-cutting areas that apply to both water and sanitation: (1) raising awareness; (2) promoting good governance, and (3) facilitating regional cooperation.

Raising Awareness

Consistent with the Framework, participants noted the importance of raising decision-maker and stakeholder awareness of water and sanitation service delivery challenges and of potential solutions that can lead to improvements in quality of life. According to participants, cities and other stakeholders should work together to strengthen decision-maker awareness as a means for enhancing political will to promote improved policies and practices, as well as necessary investments. Cities should deploy tools and approaches for increasing awareness and strengthening public involvement.

More specifically, in the case of tariff adjustments, participants emphasized the importance of engaging elected officials and other decision-makers on the critical importance of appropriate tariffs in generating the revenues necessary to improve quality of service, especially for the urban poor, who have demonstrated their willingness to pay for services. On the sanitation side, there is a critical need to inform decision-makers, communities and other stakeholders of the negative impacts inadequate sanitation services. Participants agreed that increased awareness of negative impacts of poor services delivery (e.g., increased waterborne illnesses, lower economic growth) will stimulate demand for action and a willingness to pay for services.

Promoting Good Governance

Good governance was central to participant recommendations for improving water and sanitation services, which also reflects core elements of the ESC Clean Water Framework. Participants recommended improved governance systems that ensure stakeholder participation in tariff setting, standards and regulations development, and facility siting, and provide for improved enforcement. Cities also recognized the importance of new policies and legal requirements for ensuring equitable provision of services to the urban poor in part by addressing obstacles that limit service delivery to unauthorized urban settlements. Participants also recommended efforts to promote the establishment of independent regulatory oversight bodies to address tariffs and oversee service delivery.

“All cities face similar problems, but if we can network and share experiences among these cities, then we can tackle a whole range of problems by focusing on capacity building. At the regional level, this is what we want to create.”

Dr. Raman Letchumanan
Head, ASEAN Environment Unit

Facilitating Regional Cooperation

Cities were in uniform agreement that counterpart exchange among cities would accelerate positive change. Sharing innovations on standards, technologies, governance structures, facility operations, awareness campaigns and other key strategies via exchange visits would enable cities to overcome obstacles and promote needed investment. Cooperation between ASEAN cities could also provide a platform for capacity building through regional training initiatives as well as city-to-city “twinning” programs. ASEAN cities welcomed opportunities for facilitated partnerships that enabled cities to share knowledge, expertise and best practices that would bring mutual benefits to all partners.

Table 4: Regional Action Agenda

PRIORITY CHALLENGES	PROPOSED SOLUTIONS AND ACTIONS
Water	
1. Limited political commitment	<ul style="list-style-type: none"> ▪ Increase decision-maker and community awareness through media and other communication channels ▪ Improve governance systems to strengthen participation and accountability, and equitable access to services
2. Limitations in capital investment and financing	<ul style="list-style-type: none"> ▪ Improve internal financial systems to enable providers to become more creditworthy ▪ Facilitate access to internal funding, government subsidies, and private investments/loans for service improvements
3. Limitations in availability of good quality source water	<ul style="list-style-type: none"> ▪ Improve management of water catchments and distribution through regional cooperation
4. Inadequate tariffs	<ul style="list-style-type: none"> ▪ Increase decision-maker and stakeholder awareness on appropriate, cost recoverable tariffs and increase understanding of overall linkage between tariffs and investments in service expansion ▪ Support efforts to undertake tariff reform that ensures effective stakeholder participation ▪ Establish independent regulatory bodies to undertake periodic tariff adjustments and audits
5. Low priority placed on serving the poor	<ul style="list-style-type: none"> ▪ Conduct awareness campaigns to orient service expansion to underserved urban poor areas ▪ Reform policies and legislation to promote service expansion to underserved urban poor areas ▪ Encourage governments through training initiatives to meet their social obligations to serve the poor
Sanitation	
1. Limited political commitment and awareness on importance of improved sanitation	<ul style="list-style-type: none"> ▪ Raise understanding and knowledge of decision-makers and the public about health, economic and environmental impacts of improved sanitation through targeted campaigns and regional cooperation ▪ Involve the media and civil society organizations in promoting the importance of sanitation services and create social pressure to assure government accountability of providing adequate services ▪ Involve the public in sanitation strategy development and planning ▪ Work with regional organizations and platforms (e.g. ASEAN) to increase decision-maker awareness
2. Lack of standards for sanitation management (e.g. septic tanks, septage management, hygiene promotion)	<ul style="list-style-type: none"> ▪ Promote and facilitate sharing of best practices on sanitation management between Asian counterparts ▪ Improve capacities to understand, establish and apply relevant standards, procedures and systems based on regional best practices, especially on septage management
3. Limitations in availability of land for wastewater treatment facilities	<ul style="list-style-type: none"> ▪ Conduct public outreach activities during facility site selection and development ▪ Use innovative technologies to optimize land use based on international experiences ▪ Introduce and enforce better land use regulations, including using undesired public sites for treatment facilities
4. Limitations in available financing	<ul style="list-style-type: none"> ▪ Develop innovative financing schemes (e.g. pooled financing, bonds and efficiency improvement loans) ▪ Raise awareness of development finance institutions of sector financing opportunities ▪ Provide government incentives for businesses to invest in new technologies and use of local resources
5. Inadequate tariff structures	<ul style="list-style-type: none"> ▪ Implement and/or revise tariffs through public consultations with reference to international best practices ▪ Increase decision-maker understanding of sanitation investment needs and financing strategies ▪ Implement effective tariff billing and collection systems (e.g. combining water and wastewater bills)

5. TWINNING PARTNERSHIPS

In addition to working with ASEAN ESC Initiative on elaborating a regional strategy and facilitating regional exchange, in 2007 and 2008, ECO-Asia facilitated the development of “twinning” partnerships between counterpart utilities or cities to demonstrate effective strategies for improving access to water and sanitation. During 2009, ECO-Asia will continue to identify opportunities to facilitate twinning partnership with ESC member cities in part through a small grants program.

UTILITY-TO-UTILITY “TWINNING”

Focused and sustained exchange, or twinning, between counterpart governmental or non-governmental organizations is a proven mechanism for overcoming development challenges by sharing best practices and building capacity. Water and wastewater service providers worldwide have demonstrated the value of twinning in promoting the adoption of improved policies and practices, and in building human and institutional capacity.

Per the Hashimoto Action Plan developed during the 4th World Water Forum in 2006, UN-HABITAT is promoting and coordinating twinning arrangements, or Water Operators Partnerships (WOPs), “in order to strengthen the capacities of the public water operators that currently provide over 90 per cent of the water and sanitation services and who are key players for attaining the Millennium Development Goals on drinking water supply and sanitation”.

A range of international organizations and donors are working to promote and coordinate this work. The International Water Association (IWA) is developing and coordinating WOPs in the developed economies. The World Health Organisation (WHO) has also proposed a course of action for an integrated UN system of support for WOPs. The Asian Development Bank (ADB) and the Global Water Partnership (GWP) are cooperating to support the implementation of the WOPs initiative in the Asia Pacific region.

ECO-Asia Twinning Program

ECO-Asia facilitates twinning arrangements between utilities, cities, governmental agencies and financial institutions in partnership with regional networks and organizations, which help disseminate and replicate results. ECO-Asia develops twinning arrangements by identifying partners, forming agreements and work programs, and supporting activity implementation. Under the ECO-Asia approach, partners establish a cooperative program that defines roles and responsibilities, resource requirements and expected outcomes.

ECO-Asia twinning partnerships result in the adoption of policies or practices that lead to improved or expanded water or wastewater services. To ensure effective and sustainable outcomes, twinning partnerships have mutual, though not necessarily equal, benefits for both partners. Partners support programs on a cost-share basis, providing in-kind and funding support for each activity. Twinning activities include peer review, technical assistance in development and implementation of improved policies and practices, specialized on-the-job training, technology demonstration and information exchange.

ESC Twinning Partnerships

To demonstrate strategies for sharing best practices between ASEAN cities, ECO-Asia established and implemented twinning partnerships between selected ASEAN ESC member cities. In particular, ECO-Asia established linkages between: (1) Indah Water Konsortium, which operates in Putrajaya, Malaysia and Ha Long Urban Environmental Company in Vietnam on strengthening wastewater management services delivery; (2) Iloilo, Philippines and Phnom Penh, Cambodia on community-based sanitation and health; and (3) King County Wastewater Management, USA, and the Wastewater Management Authority of Thailand and Krabi, Thailand on optimizing wastewater system operations and maintenance.

These three twinning partnerships are intended to demonstrate best practices for overcoming priority sanitation challenges, as well as the effectiveness of twinning. The next section provides details on the twinning partnership objectives, activities and outcomes.

ASEAN ESC Twinning Grants Program

To build on the success of twinning, ECO-Asia and ASEAN ESC Initiative are launching a competitive, small grants program that will enable development of new twinning arrangements between ASEAN Environmentally Sustainable Cities and/or their water and wastewater service providers. ASEAN Environmentally Sustainable Cities and their water and wastewater service providers and related partners may apply for an ECO-Asia small grant, except for cities and partners in countries that are not eligible for USAID assistance. ECO-Asia grants will facilitate the adoption of best practices and innovative solutions that enable: (1) water services delivery to the poor; (2) sustainable sanitation solutions; (3) utility performance improvements; and (4) innovative financing. Small grants will require cost-share on an in-kind or cash basis by the grantee and twinning partner.

ESC TWINNING PARTNERSHIP SUMMARIES

IMPROVING WASTEWATER MANAGEMENT SERVICES Wastewater Management Authority and Krabi and King County		
Location: Krabi	Partner(s): Krabi Municipality, Thailand Wastewater Management Authority (WMA) and King County, USA	2007 - 08
<p>Over the last 20 years, the Royal Thai government funded the construction of 87 wastewater management facilities throughout Thailand. Local government authorities (LGAs) are responsible for operating and maintaining these systems, but many lack the technical and financial resources required to fulfill this mandate. Shortcomings include weak personnel capacities, limited capabilities to collect user charges, inadequate public communications and outreach and insufficient budget.</p> <p>Thailand's WMA assists LGAs in rehabilitating defunct wastewater treatment facilities and in managing their transition to full operational status. WMA's support includes: system rehabilitation; and technical assistance for operations and maintenance (O&M), billing and collection support and public outreach. WMA is currently working with 11 municipalities throughout Thailand, including Krabi, which is a member city of the ASEAN ESC.</p> <p>According to the rapid survey results, Krabi Municipality identified improving the capacity to manage its wastewater as a priority challenge. To assist the Krabi and support WMA in improving wastewater management services in Krabi, ECO-Asia has facilitated a twinning partnership between WMA and Krabi with the King County Wastewater Treatment Division in Washington State, USA. In the twinning partnership, King County shares its best practices through training programs and helps develop manuals/operating procedures for optimizing and maintaining Krabi's wastewater treatment facility. In turn, WMA institutionalizing the new approaches for application in other LGAs in Thailand.</p>		
Principal Twinning Activities		
<ul style="list-style-type: none"> ▪ Strengthening the capacities of WMA and Krabi Municipality to improve wastewater management services by developing and implementing a training program based on practical solutions developed by King County ▪ Demonstrating an effective wastewater treatment plant audit in Krabi to identify and implement activities for optimizing system operations. ▪ Developing and applying guidelines and procedures to assess, operate and optimize Krabi's treatment system. ▪ Sharing best practices and innovations for system maintenance with WMA and Krabi ▪ Disseminating and applying results at other LGAs throughout Thailand 		
Expected Results		
<ul style="list-style-type: none"> ▪ Adoption and application of practical experiences to operate, maintain and optimize treatment system operations in Krabi such as reviewing plant performance, process troubleshooting, and implementing a preventative maintenance program. ▪ Increased WMA and Krabi capacities to operate a wastewater treatment plant. ▪ Improved wastewater management services to safeguard coastal water quality. ▪ Development of guidelines for operating and maintaining the wastewater system in Krabi. ▪ Dissemination of the guidelines throughout Thailand and in Asia. 		

PROMOTING COMMUNITY-BASED WATER, SANITATION AND HYGIENE Municipality of Phnom Penh and Iloilo City		
Location: Phnom Penh	Twinning Partners: Municipality of Phnom Penh, Cambodia and Iloilo City, Philippines	2007 - 08
<p>Phnom Penh faces challenges in providing water and wastewater services to urban fringe areas, which require major infrastructure investments. Following recent decentralization legislation stipulating a bottom-up planning and budgeting process, the Municipality of Phnom Penh embarked on a pilot project with ECO-Asia to develop local sanitation plans with stakeholder inputs in a selected district.</p> <p>ECO-Asia provided assistance for the preparation of rapid surveys to identify health and sanitation challenges and priorities for one of Phnom Penh's urban fringe district of Russei Keo. Based on these surveys and subsequent community consultations, the district then identified short- and long-term strategic interventions for addressing wastewater management and health issues, focusing on the improvement of knowledge, attitudes and practices regarding sanitation, water use and hygiene.</p> <p>ECO-Asia then facilitated a twinning partnership between Phnom Penh and the city of Iloilo in the Philippines. The partnership includes a range of sanitation and hygiene promotion activities in one selected sub-district in Russei Keo, with implementation assistance from a local NGO, the Center for Development (CfD). The design and preparation of the promotion materials and activities closely follows an approach for water and sanitation promotion developed by ECO-Asia. Thus, Phnom Penh serves as a testing ground for a promotion toolkit that other ASEAN cities could use to improve community-based water, sanitation and hygiene.</p>		
Principal Twinning Activities		
<ul style="list-style-type: none"> ▪ Developing and disseminating appropriate and effective promotional materials, including school book covers, posters and leaflets, to raise awareness of sanitation and hygiene in Russei Keo district ▪ Facilitating a community outreach initiative by Phnom Penh Water Supply Authority (PPWSA) in Russei Keo, where PPWSA will promote its pro-poor house connection scheme. ▪ Organizing a water, sanitation and hygiene (WASH) day at the sub-district level, followed by WASH events in six schools in Russei Keo. ▪ Facilitating the development of an environmental health strategy for Russei Keo, focusing on additional sanitation and hygiene promotion activities at the sub-district level. ▪ Disseminating and applying results in other districts in Phnom Penh Municipality. 		
Expected Results		
<ul style="list-style-type: none"> ▪ Increased sanitation and hygiene awareness among schoolchildren and other community members in Russei Keo district. ▪ Development of an environmental health strategy for Russei Keo that will continue to build awareness and improve sanitation practices. ▪ Development and testing of a promotional toolkit and environmental health strategy that will be used in other districts in Phnom Penh Municipality and other ASEAN ESC ▪ Improved capacity at the district and municipal level to design and implement community-based water, sanitation and hygiene promotion campaigns. 		

OPTIMIZING WASTEWATER SYSTEM OPERATIONS Ha Long City, Vietnam and Putrajaya, Malaysia		
Location: Ha Long City	Twinning Partners: Ha Long City People's Committee, Vietnam and Indah Water Konsortium (IWK) in Putrajaya, Malaysia	2007 – 08
<p>Located in Ha Long City, Ha Long Bay, a UNESCO World Heritage site that includes approximately 1,600 islands and islets, forming a spectacular seascape of limestone pillars. In an effort to protect this natural resource and Ha Long's tourism industry, as well as reduce waterborne diseases, the City People's Committee (CPC) of Ha Long City has taken significant steps to improve sanitation services. Successes include building new sanitary landfills, planning and constructing a septage treatment facility, and constructing the Bai Chay centralized wastewater treatment plant and interceptor sewer system.</p> <p>Consultations with the Ha Long Urban Environmental Sanitation Company (URENCO), CPC's treatment plant operator, indicated that its staff needed additional operator training to better operate and maintain the Bai Chay wastewater treatment facility and the interceptor collection system. To facilitate the optimization of Ha Long's wastewater system operations, ECO-Asia developed an intensive, practice-oriented training program involving specialists from the Indah Water Konsortium (IWK), a Malaysian government-owned wastewater management corporation.</p> <p>Through the twinning partnership, IWK worked with Bai Chay to develop individual procedure sheets illustrating a step-by-step approach to performing tasks required to optimize the sewer system and treatment plant. IWK has provided the procedure sheets and other training material to URENCO, which will replicate the training for operator staff of a second wastewater treatment plant that will come online next year.</p>		
Principal Twinning Activities		
<ul style="list-style-type: none"> ▪ Conducting a needs assessment regarding staff capacity to optimize and effectively operate the Bai Chay treatment plant and sewer interceptor system ▪ Developing an accounting spreadsheet to determine the actual cost of operating and maintaining the plant and set cost-recovering user fees. ▪ Training Ha Long staff on operations and maintenance procedures for the sequencing batch reactor (SBR) technology specifically designed for the Bai Chay treatment facility. ▪ Conducting a training exchange visit for Ha Long URENCO and Bai Chay staff to learn about 26 operations and maintenance procedures utilized at IWK. ▪ Disseminating and applying results at other treatment plants in Vietnam using SBR technology. 		
Expected Results		
<ul style="list-style-type: none"> ▪ Improved sanitation for Ha Long City, safeguarding the quality of Ha Long bay's unique ecosystem. ▪ Improved capacity to implement effective procedures for the operations and maintenance of the Bai Chay treatment plan and sewer interceptor system. ▪ Development of a training manual, which URENCO and the Vietnam Water Supply and Sanitation Association are using to further develop staff capacity and optimize system operations. ▪ Dissemination of improved operations and maintenance procedures to the newly constructed wastewater treatment plant in Hon Gai, which uses the same SBR technology. 		

ANNEX A: ESC Clean Water Framework

Goal: Achieve ASEAN Long-Term Goals for water quality intended for various uses by 2010 and move towards sustainable supply and use of water

Objective	Strategies	Activities/Programs
To achieve good accessibility and quality of water supply for ASEAN cities	Provision of infrastructure <ul style="list-style-type: none"> • Apply appropriate technologies 	<ul style="list-style-type: none"> • Secure adequate sources • Provide water delivery systems • Construct water treatment, filtration facilities • Promote water metering
	Enforcement <ul style="list-style-type: none"> • Efficient supply and use of water 	<ul style="list-style-type: none"> • Review water policies and legislation • Enact legislation (anti-pilfering, appropriate use, etc.) • Promote compliance
	Monitoring <ul style="list-style-type: none"> • Establishment of baseline data on quality and accessibility of water • Water quality meeting standards for drinking water • Use data on quality and accessibility of water supply as key basis for formulating water supply policies and programs 	<ul style="list-style-type: none"> • Develop ASEAN indicators and benchmarks • Implement programs to monitor quality of water sources, water supply and accessibility • Conduct regular review of water monitoring programs so as to stay relevant • Upgrade water monitoring and assessment capabilities
	Institutional set-up <ul style="list-style-type: none"> • Political support • Sound financial structure and mechanisms • Building technical capacity and cooperation 	<ul style="list-style-type: none"> • Engage all stakeholders • Promote integrated water management structure, multi-sectoral and inter-governmental consultations • Promote public-private partnership • Develop mechanism for appropriate taxation and user fees • Implement cost recovery program • Institute demand and supply management techniques in water supply • Networking and regional collaborative action • Regional exchange of relevant information, expertise, technology and know-how • Manpower training • Enhance capacity building for implementing all the components of water management included in this Framework • Ensure that manpower and equipment requirements are in line with operational budgets and organizational mandates

Objective	Strategies	Activities/Programs
To protect water resources, safeguard ecosystems and public health, so as to achieve ASEAN water quality standards	Prevent/minimise water pollution at source <u>Industrial Sources</u> <ul style="list-style-type: none"> • Site and screen industries judiciously • Monitor and pretreat effluent before discharge into sewers or watercourses <u>Domestic Sources</u> <ul style="list-style-type: none"> • Provide sewerage system to serve all households 	<ul style="list-style-type: none"> • Segregate/zone land areas for different uses to safeguard water catchments • Institute a system/procedure to assess impact of each development before implementation • Screen industries to ensure that the best available technologies are incorporated into its processes • Require industries to install analysers/meters to monitor effluent quality such as pH and temperature before discharge • Put in place sewerage infrastructure to serve all households • Prohibit wastewater from pollutive activities from discharging into drains, canals, etc.
	Enforce and control water pollution at source <ul style="list-style-type: none"> • Use best available water pollution control technology for industries. • Enact and enforce legislation to control water pollution. • Adopt polluter pays principle 	<ul style="list-style-type: none"> • Enact trade effluent regulations • Industries to install water pollution control equipment to pre-treat waste before discharge into watercourses/public sewer • Conduct regular review of legislation and tighten, where necessary • Carry out routine enforcement checks on industries
	Monitor water quality to assess the adequacy and effectiveness of water pollution control programs <ul style="list-style-type: none"> • Water quality must meet standards for its intended uses • Use data on quality of water as key basis for formulating water pollution control policies and programs 	<ul style="list-style-type: none"> • Monitor water quality of watercourses • Conduct regular review of water monitoring programs stay relevant and to ensure that new emerging pollutants are monitored • Upgrade water monitoring and assessment capabilities
	Institutional set-up <ul style="list-style-type: none"> • Political support • Sound financial structure and mechanisms • Building technical capacity and cooperation 	<ul style="list-style-type: none"> • Engage all stakeholders • Promote integrated water management structure via consultations • Promote public-private partnership • Promote integrated water-basin planning • Establish river basin management organizations • Develop mechanism for collection of wastewater treatment fees • Implement cost recovery programme • Institute wastewater management techniques in sanitation and wastewater treatment • Networking and regional collaborative action • Regional exchange of relevant information, expertise, technology and know-how • Manpower training • Enhance capacity building for implementing all the components of water management included in this Framework • Ensure that manpower and equipment requirements are in line with operational budgets and organisational mandates

Objective	Strategies	Activities/Programs
To move towards sustainable supply and use of water	Maximise all available water resources <ul style="list-style-type: none"> Put in place modern and well-maintained sewerage and treatment facilities. Ensure right pricing. Encourage reuse and recycling of water 	<ul style="list-style-type: none"> Upgrade sewerage reticulation system and wastewater treatment facilities to meet increasing wastewater generation and minimise water leakages Maintain water supply infrastructure Impose water tariffs to curb rising consumption. Introduce incentive schemes for water conservation projects
	Divert wastewater from watercourses to deep sea (if applicable) <ul style="list-style-type: none"> Remove all sewerage treatment plants from water catchment areas 	<ul style="list-style-type: none"> Divert all sewerage treatment plants located within water catchment areas to public sewer
	Encourage major users of water to implement water efficiency or water conservation programs <ul style="list-style-type: none"> Implement joint initiatives by government and industry to improve water efficiency Use less water-intensive alternative technologies. Make water conservation our way of life 	<u>Industrial Sources</u> <ul style="list-style-type: none"> Encourage major users of water to conduct water audits and rectify water wastage problem Install water-sensing devices such as constant flow regulators <u>Commercial and Domestic Sources</u> <ul style="list-style-type: none"> Install low capacity flushing cisterns, self-closing delay action taps, etc Conduct nation-wide water conservation programs
	Diversify water sources <ul style="list-style-type: none"> Optimize water catchments Use innovative technologies to source for alternative water supplies Periodic assessment of water supply and sustainability 	<ul style="list-style-type: none"> Link up water catchment areas (if practicable) Promote use of alternative sources like recycled water, rainwater harvesting, desalination water, etc, where necessary Work with companies to research/test bed new technologies Encourage R&D in water technologies
To inculcate environmental responsibility and ownership	Increase environmental awareness and ownership amongst population and forge strategic partnerships among various stakeholders <ul style="list-style-type: none"> Increase awareness about the connection between water use and pollution, and benefits of water conservation Foster closer relationships with the public, private and people (3P) sectors and step up environmental education 	<ul style="list-style-type: none"> Encourage co-regulation and self-regulation by industries Incorporate environmental subjects into teaching curricula of all school levels (from pre-schools to tertiary level), using for example, the ASEAN Environmental Education Action Plan (AEEAP) Raise awareness among major stakeholders (e.g., politicians)

ANNEX B: Profiles of Participating ESC Member Cities*

Bandar Seri Begawan, Brunei	
Population	70,000
Area	100.36 km ²
Population Density	700/km ²
Water Source	Surface water
Water Supply Management	Dept. of Water Services of the Ministry of Development
Water Supply Coverage	100%
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 2. Identifying mechanisms for financing water supply expansion or improvements 3. Improving quality of water supply to improve public health
Wastewater Management	N/A
Wastewater Coverage	100%
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans 2. Strengthening capacity to operate and maintain existing or planned domestic wastewater treatment facilities 3. Developing a hygiene improvement program to promote public health
Phnom Penh, Cambodia	
Population	1,300,000
Area	290 km ²
Population Density	4,483/km ²
Water Source	Surface water
Water Supply Management	Phnom Penh Water Supply Authority
Water Supply Coverage	76.92% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Expanding water supply services to priority areas, including urban slums 2. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 3. Identifying mechanisms for financing water supply expansion or improvements
Wastewater Management	Municipality
Wastewater Coverage	46.15% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Developing and implementing a septage management program 2. Installing decentralized domestic wastewater treatment systems 3. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans
Siem Reap, Cambodia	
Population	788,568
Area	10,299 km ² (province area)
Population Density	77/ km ²
Water Source	Groundwater
Water Supply Management	Siem Reap Water Authority
Water Supply Coverage	0.44% of population
Water supply provision priority areas (ranked)	<ol style="list-style-type: none"> 1. Expanding water supply services to priority areas, including urban slums 2. Improving operational efficiencies of water supply service provision

* Information derived from submitted survey results, various websites (e.g. www.citypopulation.de), and correspondence with select city officials. Not all cities submitted the surveys.

per AIESC member survey	(e.g., reducing non-revenue water, enhancing billing and collection, etc.) 3. Identifying mechanisms for financing water supply expansion or improvements
Wastewater Management	N/A
Wastewater Coverage	11.94% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	1. Developing a hygiene improvement program to promote public health 2. Installing decentralized domestic wastewater treatment systems 3. Developing and implementing a septage management program
Balikpapan, Indonesia	
Population	554,943
Area	853 km ²
Population Density	651/km ²
Water Source	Ground, surface water
Water Supply Management	Balikpapan Water Supply Enterprise
Water Supply Coverage	11.87% of population
Water supply provision priority areas (ranked) per AIESC member survey	1. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 2. Expanding water supply services to priority areas, including urban slums 3. Improving quality of water supply to improve public health
Wastewater Management	Balikpapan Water Supply Enterprise
Wastewater Coverage	1,200 households
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	1. Installing decentralized domestic wastewater treatment systems 2. Developing and implementing a septage management program 3. Developing or improving a user-fee scheme for existing or planned domestic wastewater treatment facilities
Medan, Indonesia	
Population	2,036,185
Area	265 km ²
Population Density	7,684/km ²
Water Source	Ground, surface water
Water Supply Management	Medan Water Supply Enterprise
Water Supply Coverage	77.94% of population
Water supply provision priority areas (ranked) per AIESC member survey	1. Improving quality of water supply to improve public health 2. Expanding water supply services to priority areas, including urban slums 3. Identifying mechanisms for financing water supply expansion or improvements
Wastewater Management	Medan Water Supply Enterprise
Wastewater Coverage	8.25% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	1. Strengthening capacity to operate and maintain existing or planned domestic wastewater treatment facilities 2. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans 3. Developing a hygiene improvement program to promote public health
Denpasar, Indonesia	
Population	488,017
Area	128 km ²
Population Density	3,813/km ²
Water Source	Ground, surface water
Water Supply	Denpasar Water Supply Enterprise

Management	
Water Supply Coverage	60% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 2. Improving quality of water supply to improve public health 3. Expanding water supply services to priority areas, including urban slums
Wastewater Management	Public Service Body for Wastewater
Wastewater Coverage*	0% of population of centralized system – Sewerage network in Denpasar is currently under construction through Denpasar Sewerage Development Project (DSDP) funded by loan from JBIC
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Developing and implementing a septage management program 2. Developing a hygiene improvement program to promote public health 3. Installing decentralized domestic wastewater treatment systems
Luang Prabang, Lao PDR	
Population	52,945
Area	818 km ² (district land area)
Population Density	----
Water Source	Ground, surface water
Water Supply Management	Luang Prabang Water Supply Enterprise
Water Supply Coverage	35.37% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Improving quality of water supply to improve public health 2. Expanding water supply services to priority areas, including urban slums 3. Identifying mechanisms for financing water supply expansion or improvements
Wastewater Management	No official responsible organization
Wastewater Coverage	0% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Developing a hygiene improvement program to promote public health 2. Developing and implementing a septage management program 3. Raising user and community awareness of sanitation and domestic wastewater
Vientiane, Lao PDR	
Population	675,000
Area	22,564 km ² (district land area)
Population Density	----
Water Source	Ground, surface water
Water Supply Management	Vientiane City Water Supply Enterprise
Water Supply Coverage	60% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Expanding water supply services to priority areas, including urban slums 2. Identifying mechanisms for financing water supply expansion or improvements 3. Improving quality of water supply to improve public health
Wastewater Management	No official responsible organization
Wastewater Coverage	0.41% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Developing a hygiene improvement program to promote public health 2. Raising user and community awareness of sanitation and domestic wastewater 3. Developing and implementing a septage management program
Sayaboury, Lao PDR	
Population	23,884
Area	4,200 km ² (district land area)
Population Density	----
Water Source	Surface water
Water Supply	Sayaboury Water Supply Enterprise

Management	
Water Supply Coverage	82.84% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ul style="list-style-type: none"> ▪ Expanding water supply services to priority areas, including urban slums ▪ Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) ▪ Improving quality of water supply to improve public health
Wastewater Management	No official responsible organization
Wastewater Coverage	82.84% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ul style="list-style-type: none"> ▪ Developing and implementing a septage management program ▪ Installing decentralized domestic wastewater treatment systems ▪ Developing or improving a user-fee scheme for existing or planned domestic wastewater management systems
Kuantan, Malaysia	
Population	410,000
Area	2,000 km ²
Population Density	205/km ²
Water Source	Surface water
Water Supply Management	Jabatan Bekalan Air Pahang (JBA)
Water Supply Coverage	92.68% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Expanding water supply services to priority areas, including urban slums 2. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 3. Improving quality of water supply to improve public health
Wastewater Management	Indah Water Konsortium
Wastewater Coverage	68.29% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Strengthening capacity to operate and maintain existing or planned domestic wastewater treatment facilities 2. Developing and implementing a septage management program 3. Raising user and community awareness of sanitation and domestic Wastewater management in support of city systems, programs and plans
Putrajaya, Malaysia	
Population	55,000
Area	49 km ²
Population Density	1,122/km ²
Water Source	Surface water
Water Supply Management	Syarikat Bekalan Air Selangor (Syabas)
Water Supply Coverage	100% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 2. Identifying mechanisms for financing water supply expansion or improvements 3. Expanding water supply services to priority areas, including urban slums
Wastewater Management	Indah Water Konsortium
Wastewater Coverage	100% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Developing a hygiene improvement program to promote public health 2. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans 3. Strengthening capacity to operate and maintain existing or planned domestic wastewater treatment facilities
Cagayan de Oro City, Philippines	
Population	558,272
Area	48,885.83 hectares
Population Density	Urban- 22/persons/hectare; rural- 1 person/hectare; Non-Poblacion- 20 persons/hectare; Poblacion- 127 persons/hectare
Water Source	Groundwater

Water Supply Management	Cagayan de Oro Water District
Water Supply Coverage	Franchise for whole City of Cagayan
Wastewater Management	Local Government Unit
Wastewater Coverage	Political boundary of the City and one municipality in the West (Opol)
Quezon City, Philippines	
Population	2,487,078
Area	16,112 hectares
Population Density	Between 148.37 to 163.18 persons/hectare
Water Source	Surface water
Water Supply Management	Maynilad and Manila Water Company, Inc.
Water Supply Coverage	No data, but sourced from Maynilad and Manila Water Company, Inc.
Wastewater Management	City - none except household septage.
Wastewater Coverage	----
Iloilo City, Philippines	
Population	403,196
Area	7,023 hectares
Population Density	55 persons/hectare
Water Source	Ground, surface water
Water Supply Management	Metro-Iloilo Water District
Water Supply Coverage	Franchise area, 7 municipalities, 1 city
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Identifying mechanisms for financing water supply expansion or improvements (especially additional source of water) 2. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 3. Improving quality of water supply to improve public health
Wastewater Management	----
Wastewater Coverage	----
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Developing and implementing a septage management program 2. Installing decentralized domestic wastewater treatment systems 3. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans
Singapore	
Population	4,500,000
Area	704 km ²
Population Density	6,392/km ²
Water Source	Surface water
Water Supply Management	Singapore Public Utilities Board
Water Supply Coverage	100% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ul style="list-style-type: none"> ▪ Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) ▪ Expanding water supply services to priority areas, including urban slums ▪ Improving quality of water supply to improve public health
Wastewater Management	Singapore Public Utilities Board
Wastewater Coverage	100% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ul style="list-style-type: none"> ▪ Strengthening capacity to operate and maintain existing or planned domestic wastewater treatment facilities ▪ Developing or improving a user-fee scheme for existing or planned domestic wastewater management systems ▪ Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans

Bangkok, Thailand	
Population	5,658,953
Area	1,569 km ²
Population Density	3,607/km ²
Water Source	Surface water
Water Supply Management	Metropolitan Waterworks Authority
Water Supply Coverage	>91% for Bangkok and surrounding provinces (Nonthaburi and Samutprakam)
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 2. Expanding water supply services to priority areas, including urban slums 3. Improving quality of water supply to improve public health
Wastewater Management	Bangkok Metropolitan Administration
Wastewater Coverage	52.64% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Strengthening capacity to operate and maintain existing or planned domestic wastewater treatment facilities 2. Developing or improving a user-fee scheme for existing or planned domestic wastewater management systems 3. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans
Chiang Mai, Thailand	
Population	200,000
Area	----
Population Density	----
Water Source	Ground, surface water
Water Supply Management	Provincial Waterworks Authority
Water Supply Coverage	100% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Improving quality of water supply to improve public health 2. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 3. Identifying mechanisms for financing water supply expansion or improvements
Wastewater Management	Municipality
Wastewater Coverage	60% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Developing and implementing a septage management program 2. Developing or improving a user-fee scheme for existing or planned domestic wastewater management systems 3. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans
Krabi, Thailand	
Population	25,789
Area	----
Population Density	----
Water Source	Ground, surface water
Water Supply Management	Provincial Waterworks Authority
Water Supply Coverage	100% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Identifying mechanisms for financing water supply expansion or improvements 2. Expanding water supply services to priority areas, including urban slums 3. Improving quality of water supply to improve public health
Wastewater Management	Municipality
Wastewater Coverage	21.29% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Developing a hygiene improvement program to promote public health 2. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans 3. Installing decentralized domestic wastewater treatment systems

Phuket, Thailand	
Population	72,298
Area	----
Population Density	----
Water Source	Surface water
Water Supply Management	Provincial Waterworks Authority
Water Supply Coverage	82.56% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Identifying mechanisms for financing water supply expansion or improvements 2. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 3. Expanding water supply services to priority areas, including urban slums
Wastewater Management	Municipality
Wastewater Coverage	100% of population
Wastewater/sanitation services priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Developing or improving a user-fee scheme for existing or planned domestic wastewater management systems 2. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans 3. Installing decentralized domestic wastewater treatment systems
Da Nang, Vietnam	
Population	764,549
Area	1,256 km ²
Population Density	609/km ²
Water Source	Surface water
Water Supply Management	Water Supply Company
Water Supply Coverage	70-80%
Wastewater Management	Urban Environment Company
Wastewater Coverage	40-50%
Ha Noi, Vietnam	
Population	3,351,957
Area	921 km ²
Population Density	3,639/km ²
Water Source	Groundwater (existing), surface water (planned)
Water Supply Management	Hanoi Water Business Company
Water Supply Coverage	70-80%
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Improving quality of water supply to improve public health 2. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 3. Identifying mechanisms for financing water supply expansion or improvements
Wastewater Management	City Drainage Company
Wastewater Coverage	There are only two small wastewater treatment plants providing service for less than 10% of the population
Top three priority areas in sanitation services per AIESC member survey	<ol style="list-style-type: none"> 1. Strengthening capacity to operate and maintain existing or planned domestic wastewater treatment facilities 2. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans 3. Developing different financing schemes to mobilize the resources and offering relevant technical options to build sanitary latrines
Ha Long, Vietnam	
Population	200,721
Area	209 km ²
Population Density	960/km ²
Water Source	Ground, surface water

Water Supply Management	Provincial Water Supply Company
Water Supply Coverage	85.72% of population
Water supply provision priority areas (ranked) per AIESC member survey	<ol style="list-style-type: none"> 1. Expanding water supply services to priority areas, including urban slums 2. Improving operational efficiencies of water supply service provision (e.g., reducing non-revenue water, enhancing billing and collection, etc.) 3. Improving quality of water supply to improve public health
Wastewater Management	Urban Environment Company
Wastewater Coverage	70% of population
Top three priority areas in sanitation services per AIESC member survey	<ol style="list-style-type: none"> 1. Raising user and community awareness of sanitation and domestic wastewater management in support of city systems, programs and plans 2. Strengthening capacity to operate and maintain existing or planned domestic wastewater treatment facilities 3. Installing decentralized domestic wastewater treatment systems

ANNEX C: Workshop Participants

BRUNEI

Mr. Lim Ann Seng

Engineer
Department of Water Sewerage
Jabatan Kerja Raya
Jln. Tasek Lamia
Brunei Darussalam
Tel: 67 322 20292
Fax: 67 322 20291
xdesboyx@hotmail.com

Mr. Abdul Mushawwir Abdok Rahman

Engineer
Department of Drainage and Sewerage
Public works department
Brunei Darussalam
Tel: 67 323 80520
Fax: 67 323 80088
Ye_mushawwir@yahoo.com

CAMBODIA

H.E. Sok Leakhena

Deputy Governor of Siem Reap Province
Siem Reap City Hall, Cambodia
Tel: 855 63 760 957
Fax: 855 63 760 957
Mobile: 855 12 77 77 56
Leakhena_siemreapgov@yahoo.com

H.E. Mann Chheurn

Vice Governor
Phnom Penh Municipality
69 Preah Monivong, Sangkat Sras Chak
Duan Penh, Cambodia
Tel: 855 12 820 311
Fax: 855 23 430 681
sokuntheachan@yahoo.com

Dr. Visoth Chea

Assistant General Director
Phnom Penh Water Supply Authority
45, Street 106, Sangkat
Srah chork, Khan Duan Penh
Phnom Penh, Cambodia
Tel: 855 23 724 046
Fax: 855 23 428 969/657
chea@ppwsa.com.kh

P.R. CHINA

Ms. Rose Xiaowei Lang

Director
International Water Association
Room 421, Mailbox 2871
18 Shuangqing Road, Haidian District
Beijing, China
Tel: 86 10 6284 9589
Fax: 86 10 6284 9589
Rose.lang@iwahq.org.uk

INDONESIA

Ms. Rosmarini

Head of Monitoring & Recovering Environment
Environmental Impact Monitoring Board City of
Balikpapan
Jl. Jend. Sudirman, No. 1
Balikpapan City, Bastkalimanpan
Tel: 62 61 542 423 332
Fax: 62 61 542 730 912
rinibalikpapan@yahoo.com

Mr. Julian Syah

Community Based WATSAN Specialist
USAID Environmental Services Program
North Sumatera
Jl. Slamet Riyadi No. 6
Medan 20152
Tel: 62 61 453 1007/8386
Fax: 62 61 451 2884
julian_syah@dai.com

Ir. Zainal Abdin Siregar

Division Manager of Operation Zona-I
PDAM Tirtanadi Medan
Jl. Sisingamangaraja No. 1, Medan
Sumatera Utara, Indonesia
Tel: 62 61 457 1666
Fax: 62 61 457 2771

Ir. Syaiful Bahri

Head of Working Group on Sanitation
BAPPEDA (Local Planning Agency) Kota Medan
Jl. KADT. Maulana Lubis No. Medan
Indonesia
Tel: 62 61 451 7646
Fax: 62 61 453 9406

Mr. Anak Agung Bagus Sudharsana

IR, DIPLO., PLG
BAPPEDA ((Local Planning Agency) Kota Denpasar
JLN. Seruni No. 4 C
Denpasar, Indonesia
Tel: 62 361 429 030/0361 226 130
Fax: 62 361 421 822
Fispra.bpddps@yahoo.co.id

LAOS**Ms. Vatlana Boupna**

National Officer
UN-HABITAT
006/5 Phonexay Village
Kaysone Phomvihane Road
Saysettha Distric, PO Box 3270
Vientiane, Lao PDR
Tel: 856 21 450 451
Vatlana.boupna@laoprd.com

Mr. Vilack Silasack

Deputy Chief of Housing and Urban Planning
Division
Provincial Department of Communication, Post
Transport and Construction
Sayabouly Province, Lao PDR
Mobile: 856 20 581 9719
Fax: 856 74 211 056

Mr. Daophet Aroune

Director Office, Science Technology and
Environmental Office
Phonexai road, Vientiane Capital
P.O. Box 2792, Lao PDR
Tel: 856 21 911 423
dparoune@yahoo.com

MALAYSIA**Mr. Mohd. Zainal Zakaria**

Regional Operations Manager
Indah Water Konsortium SDN BHD.
Central Regional Office
No. 32 Jazan Tenaku Ampur
Zabedah, Section 9
40100 Shah Alam, Malaysia
Tel: 603 5880 6606/7205
zainal@iwk.com.my

Ms. Jarina MD Saman

Senior Technical Assistant
Putrajaya Corporation
No. 24, Peksiaran Perdana
Kompleks, Perbadanan
Putrajaya, Precinct 3
62675 Putrajaya
Tel: 603 8887 7269
jarina@ppj.gov.my

PHILIPPINES**Mr. Octavio B. Peralta**

Secretary General
ADFIAP
2F Skyland Plaza, Sen. Puyat Ave.
Makati City, Metro Manila, Philippines
Tel: 632 844 9090
obp@adfiap.org

Engr. Noel Hechanova

Department Head
City Environment and Natural Resources Office
Molo, Iloilo City
Tel: 033 336 2879
Fax: 033 336 8262
Nuel.hechanova@yahoo.com

Mr. Alex A. Abila

Head of Pollution Control Division
Environmental Protection Waste Management
Quezon City Hall
Gate 6, Kalayaan Avenue
Diliman, Quezon City
Tel: 632 924 814
Fax: 632 924 1539
Aaa_abila@yahoo.com.ph

SINGAPORE**Mr. Tan Ban Thong**

Training Manager
Singapore Public Utilities Board
Waterhub
80 Toh Guan East
Singapore 608575
Tel: 65 688 52536/962 80287
Fax: 65 688 52526
Tan_ban_thong@pub.gov.sg

Mr. Haja Nazarudeen

Assistant Director, Water Supply Networks
Department
Singapore Public Utilities Board
40 Scotts Road, #22-01 Environment Building
Singapore 228231
Tel: 65 623 58888
Fax: 65 673 13020
<http://www.pub.gov.sg>

THAILAND**Ms. Supitporn Bunnag**

Senior Environment Officer
Office of Natural Resources and Environment
Policy and Planning
60/1 Soi Phibulwattana 7, Rama 6 Road
Bangkok
Tel: 662 265 6573
Fax: 662 265 6567
supitporn@yahoo.com

Mr. Chanchai Vitoonpanyakij

Deputy Director General
Department of Drainage and Sewerage
Bangkok Metropolitan Administration (BMA)
Bangkok City Hall 2
Mitmaitri Road, Dindaeng
Bangkok 10400
Tel: 662 247 4473
Fax: 662 247 4476

Ms. Suthimol Kessomboon

Chief of Project and Sludge Management Section
Department of Drainage and Sewerage
Bangkok City Hall 2
Mitmaitri Road, Dindaeng
Bangkok 10400
Tel: 662 247 4473
Fax: 662 247 4476
ksuthimol@yahoo.com

Mr. Pichaya Chuchuen

Director of Business Development Department
Provincial Waterworks Authority
72 Chaengwattana Soi 1, Laksi
Bangkok 10210
Tel: 662 551 8461
Fax: 662 552 1548
pichayac@pwa.co.th

Ms. Tassanee Samoengwait

Director of Business Development Division
Provincial Waterworks Authority
72 Chaengwattana Soi 1, Laksi
Bangkok 10210
Tel: 662 551 8461
Fax: 662 552 1548

Ms. Kittiya Paosila

Chief of Business Development Section
Provincial Waterworks Authority
72 Chaengwattana Soi 1, Laksi
Bangkok 10210
Tel: 662 551 8461
Fax: 662 552 1548

Mr. Somsak Larpadisorn

Director of Sanitary Engineering Division
Chiangmai Municipality
1 Wangsingcome Road
Chiangmai, Thailand 50300
Tel: 665 325 1252
Fax: 665 325 1424
Somsak_larp@hotmail.com

Mr. Pompeat Sukontakanit

Deputy Mayor
Krabi Municipality
292 Maharaj Rd., Tambon Paknam
Muang, Krabi 81000
Tel: 667 561 1034
Fax: 667 562 0603

Mr. Rong Phukuwluan

Member of the Municipal Council
Krabi Municipality
292 Maharaj Rd., Tambon Paknam
Muang, Krabi 81000
Tel: 667 561 1034
Fax: 667 562 0603

Mr. Bunjop Karnsumlith

Civil Works Chief Technician
Krabi Municipality
292 Maharaj Rd., Tambon Paknam
Muang, Krabi 81000
Tel: 667 561 1034
Fax: 667 562 0603

VIETNAM**Mr. Nguyen Manh Ha**

Vice Chairman
Halong City People Committee
No. 2, Halong City
Vietnam
Tel: 84 33 825 280
Fax: 84 33 827 254

Mr. Trinh Kim Giang

Deputy Director
Hanoi Water Business Company
44 Yen Phu St. Tay Ho Dist. Ha Noi
Tel: 84 4 8238 782
Fax: 84 4 8293 882

INTERNATIONAL ORGANIZATIONS**Dr. Raman Letchumanan**

Head
Environment and Disaster Management Unit,
Bureau for Resource Development
The ASEAN Secretariat
70 A Jl. Sisingamangaraja
Jakarta 12110, Indonesia
Tel: 62 21 724 3372, 726 2991
Fax: 62 21 723 0985

Mr. Joseph Hui

Former Chairman of ASEAN Working Group on
Environmentally Sustainable Cities Initiative and
Director-General of Environmental Protection
National Environment Agency
40 Scotts Road, Environment Building
#11-00, Singapore 228231
Tel: 65 673 19304
Fax: 65 673 19922
joseph_hui@nea.gov.sg

Mr. Rudolf Frauendorfer

Senior Urban Development Specialist
Asian Development Bank
Manila, Philippines
Tel: 632 632-5987
www.adb.org

USAID/RDM/A**Mr. Winston Bowman**

Regional Environmental Director
USAID/RDM/A
U.S. Agency for International Development
Regional Development Mission/Asia
Diethelm Towers A, 10th Floor
93/1 Wireless Road
Bangkok 10330 Thailand
Tel: 662 263 7469
Fax: 662 263 7499
wbowman@usaid.gov

Mr. John Pasch

Regional Water Policy Advisor
USAID/RDM/A
U.S. Agency for International Development,
Regional Development Mission/Asia
Diethelm Towers A, 10th Floor
93/1 Wireless Road
Bangkok 10330 Thailand
Tel: 662 263 7470
Fax: 662 263 7499
jpasch@usaid.gov

ENVIRONMENTAL COOPERATION-ASIA (ECO-Asia)

Mr. Frank Randolph Shuman

Science and Technical Support
King County
Department of Natural Resources and Parks
Water and Land Resources Division
201 S. Jackson St. Suit 600
Seattle, WA 98104
Tel: 206 296 6500
Randy.shuman@kingcounty.gov

Mr. Paul Violette

Chief of Party
Environmental Cooperation-Asia
SG Tower, 5th Floor
Unit 506, 161/1 Soi Mahadlek Luang 3 Rajdamri
Road, Patumwan
Bangkok, 10330 Thailand
Tel: 662 651 8826 Ext. 121
Fax: 662 651 8864
pviolette@eco-asia.org

Mr. Sher Singh

Water and Sanitation Team Leader
Environmental Cooperation-Asia
Millennia Tower, 16th Floor, Unit 1607
62 Lang Suan Road, Patumwan
Bangkok 10330
Tel: 662 651 8977 Ext. 112
Fax: 662 651 8978
ssingh@eco-asia.org

Mr. David M. Robbins

Senior Water and Sanitation Advisor
Suite 4022, Golden Rock Building
168 Salcedo Street
Legaspi Village, Makati City 1229
Philippines 8390
Tel: 632 819 0687
Fax: 632 819 0688 Ext. 102
d Robbins@eco-asia.org.ph

Mr. Arijanto Istandar

Regional Water Coordinator
Environmental Cooperation-Asia
Millennia Tower, 16th Floor, Unit 1607
62 Lang Suan Road, Patumwan
Bangkok 10330
Tel: 662 651 8977 Ext. 111
Fax: 662 651 8978
aistandar@eco-asia.org

Ms. Pham Thi Van Lan

Vietnam Country Coordinator
#10-03 Prime Centre
53 Quang Trung Street
Hanoi Vietnam
Tel: 844 943 3263
phamtvlan@eco-asia.org

Mr. Benjamin Stoner

Director, Sustainable Economic Development
Division
PADCO/AECOM
1025 Thomas Jefferson ST. NW Ste. 170,
Washington, DC 20007-5209
Tel: 202 337 2326
Fax: 202 944 2351
Ben.Stoner@padco.aecom.com

Mr. Niels van Dijk

Deputy Chief of Party
Environmental Cooperation-Asia
Millennia Tower, 16th Floor, Unit 1607
62 Lang Suan Road, Patumwan
Bangkok 10330
Tel: 662 651 8977 Ext. 113
Fax: 662 651 8978
nvandijk@eco-asia.org

Mr. A. Mahendra

India Country Coordinator
E-8/14 Vasant Vihar
New Delhi 110057
India
Tel: 91 11 261 49 836
Fax: 91 11 261 41 420
amahendra@eco-asia.org

Mr. Jay Tecson

Water and Sanitation Specialist
Suite 4022, Golden Rock Building
168 Salcedo Street
Legaspi Village, Makati City 1229
Philippines 8390
Tel: 632 819 0687
Fax: 632 819 0688 Ext. 102
jtecson@eco-asia.org.ph

Ms. Piper Hackett

Regional Program Coordinator
Environmental Cooperation-Asia
SG Tower, 5th Floor
Unit 506, 161/1 Soi Mahadlek Luang 3 Rajdamri
Road, Patumwan
Bangkok, 10330 Thailand
Tel: 662 651 8826 Ext. 115
phackett@eco-asia.org

Ms. Watcharee Limanon

Thailand Country Coordinator
SG Tower, 5th Floor
Unit 506, 161/1 Soi Mahadlek Luang 3 Rajdamri
Road, Patumwan
Bangkok, 10330 Thailand
wlimanon@eco-asia.org

<http://usaid.eco-asia.org>

Environmental Cooperation-Asia (ECO-Asia)

SG Tower, 5th Floor, Unit 506

161/1 Soi Mahadlek Luang 3

Rajdamri Road, Patumwan

Bangkok, Thailand 10330

Office +66 2 651 8826

Fax +66 2 651 8864