

US-AEP country assessments



January 1997

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Preface

The assessments in this volume, initiated by Lewis P. Reade, director general of the United States-Asia Environmental Partnership (US-AEP), evaluate the convergence between environmental policies and the underlying determinants of urban and industrial development. Operating in ten countries as divergent as India and Singapore, US-AEP assessors probed into market forces, government policies, and public, cultural, and community factors that might affect the dynamics of environmental, industrial, and urban management. In essence, these assessments paint a clear and current picture of relatively complex trends, point to future opportunities throughout the region, and provide a practical guide for US-AEP initiatives.

Representatives from US-AEP itself and from relevant government agencies and contractors participated in the assessments. Teams were dispatched to Asia between February and June 1996. They drew on information previously gathered in Asia by US-AEP environmental infrastructure experts led by Peter Gourlay, on the visits and analyses of Michael Rock, Winrock International, and Owen Cylke, policy advisor to US-AEP, and on the unrivaled expertise of Richard Stevenson, US-AEP/Louis Berger International, and Dennis Zvinakis, US-AEP field director, both of whom were based in Manila. Furthermore, each member of the visiting teams was armed with a desk assessment previously prepared by a group of dedicated researchers led by Larry Plummer, US-AEP/International Resources Group (IRG).

The assessment teams varied from country to country. In Hong Kong, Indonesia, Philippines, Sri Lanka, and Taiwan, John Butler, director of US-AEP/IRG's policy and framework program, led the teams. John Mapes, long-time consultant to US-AEP, co-authored the Hong Kong final assessment, and Butler prepared the others. I was in charge of our efforts in and prepared the final reports for India, Korea, Malaysia, Thailand, and Singapore. Our visits were enriched by two participants from the US-AEP/Louis Berger International Clean Technology and Environmental Management component: Julie Haines in Thailand and Frank Skidmore in Malaysia, Korea, and Thailand. Winrock's Michael Rock, who participated in all assessments except Sri Lanka and Hong Kong, was an unflagging inspiration and a key source of insights, information, and analysis.

None of these assessments would have been possible without the guidance of US-AEP's exceptionally able directors of technology cooperation, the legendary "tech reps" who, in the course of the program's first five years, have developed a truly extraordinary degree of understanding of their respective countries. Their experience and connections were pivotal to the success of this enterprise. The cooperation of the foreign commercial service officers of the U.S. Department of Commerce in all ten countries and the support and advice of the foreign service officers of the U.S. Agency for International Development (USAID) in those countries, assisted by USAID missions, were also integral to our success. Help from Mark Kaseman, to name only one among many in the U.S. Environmental Protection Agency's Office of International Affairs, was also valuable on many fronts, particularly his contributions to the India assessment.

The reports that follow are based on information that is up to date through June 1996 (and later wherever possible). They have been reviewed by many and edited by Pamela S. Cubberly; but, as the authors, John Butler and I take responsibility for any errors. We believe, however, that the assessments are unique in their focus and that they will help US-AEP and others to support the environmental initiatives and ventures that offer the most promise for Asia's problem-plagued urban and industrial sectors.

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assessment: HONG KONG

Prepared by:

US-AEP



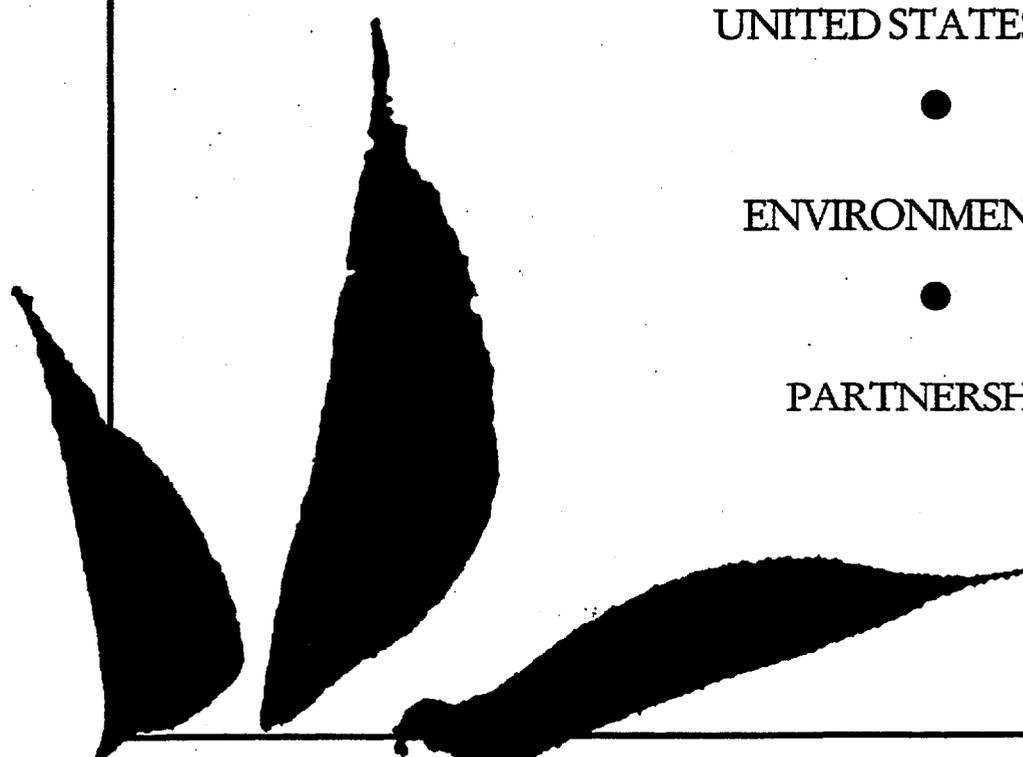
UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



Hong Kong

By John Butler and John Mapes

Hong Kong has more than 5.5 million people and a residential population density of more than 1,000 people per hectare (2.5 acres). Hong Kong Island and the New Territories make up 1,040 square kilometers (roughly six times the size and nearly twice the average population density of Washington, D.C.). As one of the “Asian Tigers,” Hong Kong has experienced phenomenal growth; its population enjoys a gross national product of more than \$23,000* per capita. Although the Hong Kong government generally takes a laissez-faire approach to industry, it has substantially strengthened its environmental policies and programs since the late 1980s. The Government of Hong Kong has programs intended specifically to provide environmental information to the public, although some nongovernmental organizations (NGOs) have complained that the public is not afforded an adequate opportunity to provide input to environmental policies.

1. Economic Profile

Demographic Conditions and Trends

As a “nation city,” it is not surprising that 95 percent of Hong Kong’s population is considered urban. The territory’s average annual rate of population growth has dropped dramatically from 1.2 percent to 0.6 percent. The infant mortality rate is among the lowest in Asia. With annual per capita income among the highest in the region, Hong Kong prides itself on its education system, which has resulted in a literacy rate that is among the highest in the region, on a par with Japan. Average life expectancy, at 78 years, is also among the highest in Asia.

Economic Conditions and Trends

The gross domestic product of Hong Kong has been growing at an annual rate of 5.5 percent. In the last ten years, much of the traditional manufacturing that occurred in Hong Kong moved to South China to take advantage of cheaper land and labor. Recently, unemployment in Hong Kong has risen to more than 3 percent,¹ raising concerns within industry and government about Hong Kong’s ability to create a sufficient number of jobs for its population.

The economy of Hong Kong is largely trade based. It has imports of \$193.2 billion (134 percent of gross domestic product) and exports of \$174.1 billion (including more than 70 percent re-exports or 121 percent of gross domestic product).² The economy consists of “services,” which make up 80–90 percent of gross domestic product, and manufacturing, which makes up the remaining 10–20 percent. Services include financial products and investment banking, real estate and construction project financing, and trade finance and services (including “value-added” sourcing, packaging, marketing, and shipping and distribution).

* Unless otherwise indicated, all dollar amounts indicate U.S. dollars.

acronyms

EIA	Environmental impact assessment
EPD	Environmental Protection Department
ISO	International Organization for Standardization
NGO	Nongovernmental organization
PRC	People's Republic of China
SPEL	Secretary of Planning, Environment, and Lands

Hong Kong is a major Asian economic center that is home to many regional headquarters of multinational corporations. Entrepreneurs and financiers residing in Hong Kong manage capital investment, manufacturing, and trade in Hong Kong and the region. Much of the manufacturing and trade that occurs in the Guangdong Province of the People's Republic of China (PRC),³ the fastest growing region in the world, is controlled by industrialists based in Hong Kong.

The foreign capital investment in the PRC that flows through Hong Kong currently includes investment from Taiwan. Recent legislative proposals in Taiwan, if passed, may allow direct investment between Taiwan and the PRC in the near future. This would reduce some of Hong Kong's related activity and may even result in Taiwan competing with Hong Kong as a "gateway" to investment in the PRC.

The single most important event in the history of Hong Kong is the pending transfer of Hong Kong back to the PRC in July 1997. The event raises great uncertainty about whether Hong Kong will continue as the premier regional center of capitalism or whether the PRC will intervene and begin to disrupt the unfettered business environment that Hong Kong provides. The government of the PRC has agreed to a fifty-year period during which Hong Kong will be allowed to operate under a "one country/two systems" rule, but concerns continue to exist about such things as the future freedom of the media, use and continuing surplus of reserves in the Hong Kong government's treasury (more than \$55 billion⁴), and freedom for businesspeople to choose any area of trade and manufacturing.

2. Environmental Profile

Industrial and Environmental Development Background

Manufacturing in Hong Kong consists largely of textile and garment production (including bleaching and dyeing), electroplating, printing, and consumer electronics (including printed circuit board assembly). The vast majority of Hong Kong's industrial base consists of small- and medium-sized facilities. Industrial

development in Hong Kong has been subject to little or no regulation. The lack of zoning laws and the shortage of land has resulted in establishment of vertically integrated “flatted factories” (small companies doing mixed types of manufacturing on individual floors of multistory buildings) in mixed-use commercial and residential areas. The limited space and small size of most of Hong Kong’s manufacturing facilities present a serious obstacle to adoption of appropriate pollution control technology.⁵

Environmental Conditions

Air pollution is the most obvious environmental problem facing Hong Kong citizens. Vehicle emissions are the greatest contributor to air pollution, particularly due to the large number of diesel engine vehicles (taxis, buses, and trucks). The Government of Hong Kong has introduced fuel efficiency standards, required petrol stations to provide lead-free petrol, and experimented with subsidized pricing to promote the use of lead-free petrol and the shift from diesel to petrol. With low income taxes and import duties, fiscal incentives to promote a shift to unleaded petrol are weak.⁶

A recent study of toxic air pollutants completed by the Hong Kong Environmental Protection Department (EPD) concluded that benzene, 1,3 butadiene, diesel particulates, hexavalent chromium, and perchloroethylene are the toxic pollutants of most concern.⁷

Pollution of Victoria Harbour is a serious problem, largely attributed to the more than 2.2 million cubic meters of raw wastewater that flows from sewers and storm water drains into the harbor and surrounding waters. This problem will be greatly ameliorated with completion of Hong Kong’s Strategic Sewage Disposal System (see section 5), which when fully operational will intercept and treat most of the pollution that is now discharged into the harbor.⁸

To address its growing solid waste problem, Hong Kong has closed old landfills and now has three state-of-the-art landfills servicing the entire populace. Construction waste is the largest component of the solid waste generated in Hong Kong. A construction waste reception facility opened in 1995. The facility will recover and divert reusable inert material from disposal. Noise and dust pollution, largely due to construction, are also major public concerns.

Environmental Trends and Issues

Hong Kong largely has the capacity to analyze and track short- and long-term air and water quality trends. EPD maintains a network of fixed-site air quality monitors on Hong Kong Island and the New Territories. Data from the network, combined with implementation of an air quality model currently under development, should give the department a sound basis for evaluating and upgrading its air quality management plan.⁹ EPD and its predecessor agency have monitored water quality in Victoria Harbour for the past fifteen years, and, in collaboration with researchers in the PRC, EPD has developed a system of water quality and hydraulic models to observe and predict changes in sea water quality in an area three times the size of Hong Kong’s territorial waters.¹⁰

EPD reported in 1993 that ambient concentrations of total suspended particulates exceeded Hong Kong's Air Quality Objectives in areas of heavy motor vehicle traffic by 30–40 percent and nitrogen oxides by 15–20 percent. Sulphur dioxide standards were generally met in all but a few locations near industrial facilities.¹¹

EPD also reported in 1993 that a modest but steady improvement had occurred in river and stream quality since 1989, resulting from implementation of effluent standards, livestock waste control, and new sewerage systems in the New Towns; however, Victoria Harbour would not meet Water Quality Objectives until the Strategic Sewage Disposal System (see section 5) became operational.¹² The first phase of the system, scheduled for completion in 1997, will intercept and treat 70 percent of the pollutants now discharged to the harbor.¹³

A waste reduction study commissioned by EPD projected that Hong Kong will experience an increase in municipal solid waste from 7,900 tons per day to 12,300 tons per day in 2006. Unless this trend is reversed by implementing a set of policies to reduce waste generation and improve the current practices for disposal of construction waste, the three strategic landfills will be filled in only seventeen years and the urban landfill in thirteen years.¹⁴

3. Government

Hong Kong's current governmental structure provides for distinct and autonomous roles for departments responsible for support to industry (primarily the Industry Department) and for environmental regulatory matters (EPD). The Legislative Council plays a larger role in the administrative affairs of executive departments than is the case for most of the other countries in the Asian region.

Key Ministries for Industrial and Environmental Matters

The *Secretary of Planning, Environment, and Lands* (SPEL), Environment Division of the Planning, Environment, and Lands Branch, has overall responsibility for policy matters related to environmental protection. SPEL reports directly to the executive and legislative councils for approval regarding major policy objectives and new legislation.

The *Environmental Protection Department* is the main environmental standard-setting and compliance organ in Hong Kong. EPD is responsible for setting and enforcing pollution control standards, monitoring environmental quality, planning treatment and disposal for all types of wastes, and conducting environmental impact assessments (EIAs) for town plans, large industrial plants, and any other developments that might have significant environmental impact. EPD provides SPEL with help in formulating new policies and programs. The department is also the central environmental complaint and inquiry service. EPD conducts enforcement through local control offices.

The *Industry Department* provides support to Hong Kong's industries by commissioning studies, providing information services, and administering industrial support funds.¹⁵ To assist industry, the Industry Department engages consultants and quasi-public organizations, such as the Hong Kong Productivity Council, to provide research and development and other assistance. The Industry Department administers the Industrial Support Fund, which is intended to enhance the competitiveness of the local manufacturing industry.

The *Hong Kong Productivity Council*, with government support and consultancy fees, conducts technical research and development for Hong Kong industry. The Hong Kong Productivity Council is currently conducting environmental programs such as an ISO (International Organization for Standardization) 14000 Pilot Project, clean technology research and development, and pollution control research and development. Most of the activities are focused on providing assistance to small- and medium-sized enterprises.

The *Drainage Services Department* is responsible for planning and maintaining the large sewerage disposal scheme and the storm water drainage system.

The *Civil Engineering Services Department* is responsible for procuring and managing design and construction services for public works, including the massive planned additions to environmental infrastructure.

Other Key Institutions for Industrial and Environmental Matters

The *EPD Clean Technologies Interest Group*, an informal group of EPD professionals, publishes a newsletter on opportunities to adopt cleaner technologies. The group is also building a data base of sources of information about clean technologies.

The *Environmental Pollution Advisory Committee* provides advice to SPEL on all pollution-related matters. The committee's membership, appointed by the governor, is entirely made up of NGOs.

4. Policies and Laws

Unlike many of its neighbors, Hong Kong does not have a history of economic protectionism. The government's industrial policy is one of "minimum intervention/maximum support" to Hong Kong's industries.¹⁶ On the environmental policy side of the equation, however, the government has dramatically strengthened its environmental laws, regulations, and programs, particularly since the late 1980s. The environmental policy framework is based largely on a command-and-control approach, although a limited but controversial charge scheme for industrial effluents has recently been implemented.

Environmental Policies and Laws

Regulatory framework. The Government of Hong Kong manages environmental issues through various ordinances focused on specific environmental media.¹⁷ Recently, ordinances have been amended and stronger regulations have resulted in positive change. Until the passage of the Water Pollution Control

Ordinance in 1980, enactment of Water Pollution Control Regulations in 1986, recent enactment of the Sewerage Services Ordinance in 1994, and tougher sewerage regulations in 1994 and 1996, most industries were allowed to discharge untreated wastewater directly into marine and inland surface waters without penalties or costs imposed.

Implementation of legislation has been generally slow. For example, in 1989 SPEL proposed creating ten water control zones under the Water Pollution Control Ordinance. The tenth water control zone, Victoria Harbour, was only just declared and brought under regulatory control in 1996. The Victoria Harbour water control zone has by far the largest number of industrial facilities. The designation and control of a water control zone does not necessarily translate into environmental protection. With designation of the Victoria Harbour water control zone, industries have been given eight months to apply for discharge licenses; however, because only a few of the many industries and residents in the zone are served by the existing sewer system, EPD will be lenient in enforcing effluent standards violated by facilities.¹⁸

The Government of Hong Kong has implemented a strategic approach to implementing and monitoring its environmental programs. It commissioned an environmental study in 1989 that resulted in the landmark policy statement titled *1989 White Paper: Pollution in Hong Kong, a Time to Act*. The white paper assessed the state of Hong Kong's environment and recommended initiatives and targets for the next ten years. Recommendations included development of a system for collection, treatment, and disposal of sewage; development of facilities for collection, treatment, and disposal of chemical and municipal wastes; and creation of various government departments and councils responsible for anticipating and mitigating the environmental impacts of future economic development. Three subsequent reviews (1991, 1993, and 1996) have assessed the progress of EPD in implementing the recommendations of the 1989 white paper.

"Polluter pays" principle. The government program to implement a "polluter pays" principle through user fees has had mixed results. Currently, no user fees are levied on solid waste collection and disposal (although EPD's waste reduction study¹⁹ commissioned by EPD does recommend them).

In 1995 user fees were established for domestic and industrial sewerage services, including a trade effluent surcharge imposed on more than thirty selected trades and industry sectors in which effluent is of higher strength than domestic sewage; however, the charges, if imposed at all, reflect only a portion of the operating costs of sewerage services (the capital costs are funded under the Capital Works Programme). Observers have questioned whether the charges are sufficiently high to provide any kind of incentive for improved environmental performance. Furthermore, industry polluters complain that the charges are based on the average characteristics of effluent by industry sector for geographic areas and are not based on the actual characteristics of the effluent of a specific facility.²⁰

A chemical waste collection system and treatment facility began operation in 1994. Initially, no user fee was charged for submitting chemical wastes to the system. Recently, a user fee representing 20 percent of variable costs was imposed, to be increased at a future date up to 100 percent of variable operating costs. Even at these marginal amounts, complaints about the charges were registered by industry.²¹

Environmental impact assessments. In 1992 the Government of Hong Kong implemented the use of EIAs for public policy proposals and public projects. This was an administrative, discretionary initiative that was not required by law. In January 1996 legislation was introduced in the Legislative Council to make the EIA process mandatory and apply it to private developers of projects greater than a certain size.²² Considerable public debate is taking place on the size threshold for the EIA requirement. In addition, questions have been raised by the environmental community about the extent of public participation and review in the EIA process and public access to information, including EIA statements.

Industrial Policies and Laws

The industrial policy of the Hong Kong Industry Department and the Government of Hong Kong at large is described as “maximum support/minimum interference.”

Maximum support. The approach of the Government of Hong Kong has been to support industry through departments and councils, such as the Industry Department and the Hong Kong Productivity Council.

In terms of environmental management, industry is provided maximum support through subsidized environmental infrastructure. The Government of Hong Kong pays for the capital costs of environmental infrastructure out of its treasury reserves. If industries are charged a user fee for waste management, it is only a portion of the variable costs associated with the collection, treatment, and disposal of wastes. For example, the rates charged by the newly opened Chemical Waste Treatment Center are about 20 percent of variable costs and were established with plans to ramp up the rates at some future point in time to reflect full variable costs.

The Industry Department commissioned a study of Hong Kong industry in 1992 and recommended upgrading the technological level of the four primary industries present in Hong Kong, that is, textile/garment, printing, electroplating, and consumer electronics. In response, the Industry Department created the Industrial Support Fund to promote technological improvements and attract high-value manufacturing to Hong Kong. In addition, the department commissioned numerous studies, reports, and projects to provide manufacturers with information and services.

Minimum intervention. The laissez-faire approach permeates all government departments and is a widely accepted approach to governing. Little or no central industrial planning is undertaken. This approach defines the way that the government assists Hong Kong industry. For example, Hong Kong has “observer status” at the International Organization for Standardization; however, although the Industry Department has funded the ISO 14000 Pilot Program of the Hong Kong Productivity Council, no plans exist to create an “accreditation board” or establish an accreditation/certification infrastructure. This level of involvement is left to the private sector.

Except for the infrastructure subsidies discussed above, the government is reluctant to use fiscal incentives to effect behavioral change. No or low import and export tariffs exist in Hong Kong. Income taxes are relatively low at 15 percent with no fiscal income tax subsidies (e.g., accelerated depreciation or tax credits). The government derives most of its revenue from the lease of land to developers. Unfortunately, when environmental regulation may result in significant impact on Hong Kong business, the approach has often been to develop nonrestrictive guidelines, issue waivers, or ramp up regulation slowly.

Intervention anomaly. The ongoing shift of manufacturing to South China and the recent increase in the level of unemployment (more than 3 percent) in Hong Kong have motivated the government to seek to attract manufacturing back to Hong Kong. To do this, the government plans to create industrial estates that are projected to provide 15 percent of future manufacturing jobs in Hong Kong.

A current industrial estate offers land leases at levels 20 percent of (80 percent below) the prevailing market rates in Hong Kong.²³ The industrial estates will seek tenants that will bring high-value-added industries (e.g., Motorola has been negotiating to build a semiconductor plant on one industrial estate). The industrial estates will provide common effluent treatment facilities and other environmental and traditional infrastructure.

Public Information Policies and Laws

Although Hong Kong has an “access to information” code, it is not comparable to a “Freedom of Information Act” type of law, because it does not require government agencies to respond to public requests for information; however, government departments do provide a substantial degree of information access to the public and provide channels for the public and NGOs to participate in policy and regulatory decisions (e.g., procedures for public comment on proposed rules, public hearings, and so forth). EPD has a number of programs directed to providing community information and encouraging public participation in its programs. These include publishing annual reports providing air and water quality—monitoring results and operation of an environmental resource center specifically intended to provide the public with environmental information; plans exist to open additional centers throughout the territory. SPEL has commissioned a study on life cycle analysis and product ecolabeling that will include development of a framework for informing consumers on the environmental merits of products.²⁴

NGOs have complained, however, that specific information is difficult to locate and obtain beyond that provided in documents prepared for the public, particularly regarding individual industrial facilities. Public registers are even difficult to locate and access. One example cited during the United States-Asia Environmental Partnership (US-AEP) country visit was a situation in which an NGO had to make more than seventy telephone calls to various branches of EPD to locate and obtain a document on the public register.²⁵

Legal and Policy Developments of Particular Relevance to Industrial and Urban Environmental Management

The Government of Hong Kong has a long history of nonintervention in its economy. Regulation has often taken the form of voluntary guidelines and government assistance, rather than command and control mandates. Recent legal and policy issues include the statutory use of EIAs in large private development projects, level of public review and access to information, and implementation of the “polluter pays” principle.

Although the various government departments and councils are moving forward to implement and enforce current environmental ordinances and regulations and construct planned environmental infrastructure, further environmental legal and policy developments may be delayed until after the 1997 transition giving control of Hong Kong to the PRC.

SPEL has recently announced that it plans to launch a major study later in 1996 (subject to funding approval from the Legislative Council) to build sustainability considerations into the government's strategic development planning and enhance public awareness and education on environmental issues.²⁶

The EIA ordinance currently pending before the Legislative Council includes a strong community right-to-know mandate and will require project sponsors to make information generated in EIAs available to the public.

5. Urban Environment and Infrastructure

A small percentage of industry and residents currently have access to sewer systems; however, a huge Strategic Sewerage Disposal Scheme, composed of sixteen geographic sewerage master plans, was proposed in 1989; the first of its four stages is due to be completed in 1997. Until the scheme is completed, government enforcement of effluent standards will remain lenient. In fact, in most cases, no sewers are currently available for connection and may not be available for years. In such cases, the government may require companies to install on-site pollution control equipment or may reduce or waive compliance requirements. Many industries are temporarily allowed to discharge into storm water drains.

Unlike other countries in the region, groundwater contamination is not considered a serious public health threat because Hong Kong does not rely on groundwater for its water supply. Instead, the territory obtains 10–15 percent of its water from man-made reservoirs and 85–95 percent via pipelines from rivers in China.²⁷

Every year, Hong Kong generates more than 8,500 tons of municipal solid waste, more than 15,000 tons of construction waste, 110 tons of sewage sludge, about 100,000 tons of chemical wastes, and more than 2 million cubic meters of liquid effluent.²⁸

Hong Kong is in the seventh year of an ambitious ten-year plan set out in the 1989 white paper to develop appropriate environmental infrastructure. Progress to date in implementing environmental infrastructure projects includes the following²⁹:

Water Supply

The water supply needs of Hong Kong are largely met. The cost of water is four times that reflected in user fees, but no plans exist to change the fee structure.

Wastewater

The completion of the first of four stages of the Strategic Sewerage Disposal Scheme, providing sewer collection and treatment services to Hong Kong Island and Kowloon is expected by 1997. The first stage will capture 70 percent of the effluent currently discharged into Victoria Harbour. The second stage involves the discharge to ocean outfall (Dangan Channel) of treated effluent. Stages three and four include the collection of Hong Kong Island effluent for treatment and long ocean outfall.

Solid Waste

Three new state-of-the-art landfills in the Western New Territories, South East New Territories, and North East New Territories started operations in 1993, 1994, and 1995 respectively. The new landfills include state-of-the-art liners and leachate and methane collection and provide fifteen to twenty years of landfill capacity. In conjunction with the landfills, three of nine planned refuse transfer stations, Kowloon Bay, Island East, and Shatin, have started operations in 1990, 1992, and 1994 respectively. Two of the remaining six transfer stations will start operations in 1997, three transfer stations will start operations in 1998, and one transfer station is scheduled to begin operations in 2000.

Hazardous Waste

A new Chemical Waste Treatment Center capable of handling 100,000 tons of chemical waste started operations in 1994. A government-mandated control system tracks the transport of chemical waste from the source.

6. Private Sector and Academia

Industry

Hong Kong industry is driven by profits. Environmental activities must satisfy business objectives. A primary objective of Hong Kong industrialists is to maintain access to international markets. Significant interest exists in private sector initiatives, such as ISO 14000. More than 500 firms have gained ISO 9000 certification. The Hong Kong Productivity Council is conducting a pilot ISO 14000 program in which twelve companies will become certified as compliant with ISO 14000 standards. The Hong Kong Productivity Council as well as private consultants have conducted numerous workshops on ISO 14000.

Several industry associations (e.g., textile/garment and electroplating) confirm that international customers regularly conduct written and in-person environmental "due diligence" (e.g., site investigations and reviews of laws, regulations, and permits) of the supplier's facilities. Most of Hong Kong's industrialists and manufacturers are suppliers to the international market.

The environment committee of the American Chamber of Commerce in Hong Kong consists of environmental technology companies, consultants, and environment officers of multinational corporations with regional headquarters based in Hong Kong. The American Chamber of Commerce has a well-attended informal ongoing workshop on "doing business in China," in which companies share experiences, including addressing environmental compliance issues in China.

Several Hong Kong companies have formed the Private Sector Committee on the Environment to represent industry in public debates on environmental policy and legislation in Hong Kong. The committee also initiates projects, such as an environmental efficiency rating program for buildings. The committee has funded development of the Centre for Environmental Technology, including construction of an exhibit hall, demonstration room, and office building dedicated to promoting environmental technology in Hong Kong and the region.

Academic and Research Institutions

All of the tertiary academic institutions of Hong Kong provide courses, certificates, and degrees in various environmental fields. For example, the Hong Kong University of Science and Technology offers a bachelor's degree in civil and structural engineering with a focus on environmental engineering and a master of science degree in environmental science and engineering. The university also conducts research, such as air and noise pollution monitoring. The University of Hong Kong and the City University of Hong Kong offer similar diplomas.

In March 1996 the Faculty of Law and the Centre of Urban Planning and Environmental Management of the University of Hong Kong sponsored the "Asian Regional Workshop: Planning for More Effective and Workable Environmental Law." In 1995 members of the faculty and other interested parties formed the Hong Kong Environmental Law Association. The members of the association track and comment on current issues of law, such as the EIA Bill introduced in the Legislative Council in January 1996.

Financial and Insurance Institutions

Most major banks in the world have offices in Hong Kong. Banking activity includes real estate finance, regional trade finance, regional infrastructure finance, corporate finance, and private banking. In Hong Kong, high land values result in levels of collateral that significantly reduce bank risk in lending. Due to this and because Hong Kong does not rely on groundwater as a source of water supply, banks are not concerned about Hong Kong land that is contaminated with toxic wastes or liability for any possible remediation costs.

For financial deals outside of Hong Kong, particularly private investments in South China, some environmental consultants³⁰ report that international banks are increasingly funding environmental "due diligence."

Union Bank is a founding member and leader in the creation of the Private Sector Committee on the Environment. The committee represents the private sector on environmental matters (e.g., pending environmental legislation) and has initiated several projects (e.g., disseminating environmental information, conducting training courses, and promoting research). It has also bankrolled development of the Centre for Environmental Technology (see above).

7. Environmental Awareness and Public Involvement

General Public Awareness of Environmental Issues

Public concern about environmental quality is much in evidence in Hong Kong. Every year the territory under the auspices of the Governor's Environmental Campaign Committee celebrates World Environment Day and an Environmental Protection Festival. On World Environment Day 1996, the *Hong Kong Standard* ran a special feature devoted to environmental issues; however, although public awareness is strong, it is not clear how deeply environmental concerns are rooted. During the US-AEP country visit, a number of persons interviewed expressed the opinion that with the July 1997 transition looming, environmental degradation is taking a back seat in the public's list of worries.³¹

One indication of the possible lack of depth of public concern is EPD's experience with its 1995 proposal to phase out the use of diesel fuel for all light vehicles in five years. The proposal would have primarily affected taxi and light bus operators, who strongly opposed it. Even though these vehicles are among Hong Kong's most significant sources of suspended particulates—a visible problem—the general public did not provide the support needed by EPD to counter the transport operators' opposition. Consequently, the proposal was tabled for further study.³²

Nongovernmental Organizations

Hong Kong has numerous environmental NGOs.³³ Much of their activity is directed toward public awareness and education rather than political advocacy and litigation.³⁴ NGOs play an advisory role with SPEL on environmental and policy matters (e.g., through the Environmental Pollution Advisory Committee, participation in SPEL's sustainable development study, and so on), but some believe that they are not afforded substantive roles in EPD's regulatory and standard-setting activities.³⁵

8. U.S. Government Activities

The U.S. government presence in Hong Kong includes the U.S. consulate, U.S. Department of Commerce/ U.S. and Foreign Commercial Service, and US-AEP. The U.S. Agency for International Development (except US-AEP), U.S. Environmental Protection Agency, and U.S. Department of Energy have no presence in Hong Kong.

US-AEP Activities in Hong Kong

US-AEP has supported 115 environmental exchanges to Hong Kong, processed 340 trade leads, and sponsored twelve technology grants through the National Association of State Development Agencies, in addition to an environmental technology initiative through the Council of State Governments. With the U.S. Environmental Protection Agency, US-AEP has supported environmental action teams, short-term technical assistance, and training modules.

9. Other Bilateral and Multilateral Organization Activities

Hong Kong's current governmental structure provides for distinct and autonomous roles for departments responsible for support to industry (primarily the Industry Department) and for environmental regulatory matters (EPD). The Legislative Council plays a larger role in the administrative affairs of executive departments than is the case for most of the other countries in the Asian region.

Hong Kong also actively participates in the Committee on Trade and the Environment of the World Trade Organization.

The Hong Kong–Guangdong Environmental Protection Liaison Group was established in 1990 to improve cooperation on environmental issues of mutual concern. The various departments and councils of the Government of Hong Kong also have direct relations with the corresponding ministries of the central government of the PRC.

10. Opportunities to Support Clean Production and Environmental Management

Policy Framework

Little opportunity exists for affecting environmental and industrial policy by the current government. The pending transition to PRC control in 1997 totally preoccupies the government and significantly distracts industry as well. Who the decisionmakers will be after 1997 is unclear.

Many Government of Hong Kong departments and councils, however, have established contacts and hold regular meetings with PRC counterparts in Guangdong and with the central government in Beijing. After 1997, if current government policies and programs remain in place, environmental policy and framework activities involving Government of Hong Kong departments and councils may positively and substantially affect environmental management in post-1997. Some of these activities include:

Sustainable development study. EPD's SUSDEV (sustainable development) 21 Study includes a number of areas that are strategically important to integrating environmental considerations into industrial management, including development of (a) sustainability indicators, (b) a framework for integrating quantitative methods for evaluating environmental impacts into development strategies, and (c) a methodology for strategic environmental monitoring and auditing.

Public reporting. The mandatory provisions for public disclosure in the pending EIA legislation have led the Government of Hong Kong to place a new focus on its current tools for providing public access to environmental information. Furthermore, the topics of life cycle assessment and ecolabeling are currently the subject of a major study sponsored by SPEL. Implementation of practical programs to improve public communication on environmental quality and industrial environmental performance could have a dramatic, positive impact on Hong Kong's environmental quality.

Industrial Environmental Management

The opportunities to promote clean technology and cleaner production among Hong Kong manufacturers are minimal compared to other parts of the region that are experiencing high industrial growth. The amount of manufacturing that occurs in Hong Kong has declined in the last ten years and will probably continue to decline. It now represents only 10–20 percent of total gross domestic product. Companies that do manufacture in Hong Kong are mostly small, undercapitalized textile and garment makers, electroplaters, consumer electronic component makers, and printers with “flatted factories” that are an obstacle to investment in pollution control technology as well as significant process improvement.

The influence and control that Hong Kong traders have over manufacturing in the region, however, is significant and represents a real opportunity to promote cleaner production throughout the region. Hong Kong traders are keenly aware of the demands of the marketplace; many Hong Kong industrialists with factories in South China field inquiries and entertain site visits from overseas clients focusing on their environmental, health, and safety practices.

Current industrial environmental management-related activities of the Government of Hong Kong (e.g., the Hong Kong Productivity Council ISO 14000 Pilot Program) focus on factories in Hong Kong. Opportunities exist in Hong Kong to engage industrialists in a broader sense—perhaps in programs emphasizing environmental criteria and investment, environment and trade, and environment and supply chain management. Hong Kong's move to locate new manufacturing facilities in industrial estates provides another opportunity.

Environmental Infrastructure

With the 1997 transition on the horizon, the outlook for infrastructure privatization remains unclear. Significant technology transfer opportunities exist, however, to support environmental projects that are already well along in the pipeline. The largest wastewater facility in the world, capable of processing 450 million gallons a day, is being built and run by the Government of Hong Kong. Fifteen- and thirty-year build-own-transfer projects are coming on-line for incineration facilities for hospital waste and landfills. The total opportunities reflect a \$2–\$3 billion market in the next two years. Many opportunities also exist to build and operate as well as upgrade and retrofit new facilities. One major opportunity concerns landfill restoration. Most environmental infrastructure must conserve space, provide more economical and less polluting solutions, including advance primary treatment.

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Endnotes

1. See USDOC (1996). The growing unemployment rate was also mentioned during interviews with Hong Kong government officials conducted in June 1996.
2. See USDOC (1996).
3. Staff of the U.S. and Foreign Commercial Service, Hong Kong (June 1996). Much of the capital investment in China is channeled through Hong Kong and represents the largest amount of foreign direct investment in China. More than one million workers cross the border between Hong Kong and the Guangdong province every day.
4. See USDOC (1996).
5. The issue of limited space for environmental technology at “flatted” facilities was pointed out by a number of Hong Kong government officials and private sector representatives during interviews conducted by John Butler and John Mapes in Hong Kong (June 3-7, 1996).
6. A. G. (Tony) Cooper, deputy secretary (environment), Secretary of Planning, Environment, and Lands, Hong Kong (June 3, 1996).
7. C. W. Tse, assistant director, Air Division, Environmental Protection Department, Hong Kong (June 4, 1996).
8. See Hong Kong (1996c, 17).
9. C. W. Tse, assistant director, Air Division, Environmental Protection Department, Hong Kong (June 4, 1996).
10. See Hong Kong (1995a, 68-69).
11. See Hong Kong (1993, 25).
12. See Hong Kong (1993, 62-63).
13. See Hong Kong (1996c, 17).
14. See ERM Hong Kong (1996).
15. Recent Industry Department-commissioned reports and services include Hong Kong (1996a; 1996b); reference books on pollution prevention and production efficiency for the bleaching and dyeing, electroplating, and printed circuit board industries; production of an eco-audit manual and video; and setup of an environmental hotline.
16. The US-AEP assessment team heard this term cited frequently during the US-AEP country visit conducted by John W. Butler and John J. Mapes, Hong Kong (June 3-7, 1996).
17. Examples of environmental ordinances and their numerous amendments and implementing regulations include the following:
 - *Air Pollution Control (APC) Ordinance*
 - APC (Air Control Zone) (Declaration) Order 1989
 - APC (Furnaces, Ovens, Chimneys) (Installation and Alteration) Regulations
 - APC (Fuel Restriction) Regulations
 - APC (Smoke) Regulations
 - APC (Specified Processes) Regulations

Endnotes

- APC (Motor Vehicle Fuel) Regulations
 - APC (Vehicle Design Standards) (Emission Standards) Regulations 1991
 - APC (Open Burning) Regulations
 - Building (Demolition Works) Regulations
 - Road Traffic Regulation
 - Air Pollution Control Zones (Ten APC ordinances)
 - *Water Pollution Control (WPC) Ordinance (1980)*
 - WPC Regulations 1986
 - WpC (Ten Water Control Zones) Orders
 - WPC (Sewerage) Regulation 1994
 - *Waste Disposal (WD) Ordinance (1980)*
 - WD (Chemical Waste) (General) Regulation 1992
 - WD (Charges for Disposal of Waste) Regulation
 - WD (Charges for Disposal of Chemical Waste) Regulation
 - *Sewerage Services Ordinance 1994*
 - Sewerage Regulations 1994, 1996
 - Dumping at Sea Ordinance 1974
 - Ozone Layer Protection Ordinance
 - *Environmental Impact Assessment Ordinance (pending)*
18. See Hong Kong (1991a; 1995a). Concern for the environment in Hong Kong can be traced back to 1881, when a study of the sanitary conditions in Hong Kong led to the creation of a Sanitary Board, the forerunner of the current urban council. The Government of Hong Kong passed the first Clean Air Ordinance in 1959. As manufacturing activity accelerated in the late 1960s and 1970s, the government commissioned numerous studies of related pollution problems and environmental consequences.
- Envisioned by the 1989 *White Paper: Pollution in Hong Kong, a Time to Act* and authorized by the Water Pollution Control Ordinance and related amendments and regulations, the Hong Kong Productivity Councils require industries with effluent discharge to procure a license. The license specifies the allowable characteristics of the effluent (e.g., chemical oxygen demand and biological oxygen demand limits), based on whether the effluent is discharged directly into service waters or a sewer system. Recent regulations have given EPD the authority to require industries to connect to sewer systems rather than discharging to storm water drains and to charge for sewerage services.
19. See ERM Hong Kong (1996).
20. David Hall, Hong Kong Drainage Department, Hong Kong (June 6, 1996).
21. Joe Zorn, Pacific Waste Management, Hong Kong (June 3, 1996).
22. As of December 1996, the bill was still pending enactment by the Legislative Council.

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23. Hon-ho Wong, assistant director general of Industry Infrastructure Support, Industry Department, Hong Kong (June 5, 1996).
 24. A. G. (Tony) Cooper, deputy secretary (environment), SPEL, Hong Kong (June 3, 1996); also, see Hong Kong (1996c, 48-49).
 25. Terri Mottershead, Bill Barron, Jill Contrell, and Bryan Bachner, Hong Kong Environmental Law Association, Hong Kong (June 3, 1996).
 26. A. G. (Tony) Cooper, deputy secretary (environment), SPEL, Hong Kong (June 3, 1996); also, see Hong Kong (1996c).
 27. See Sanders (1995).
 28. See Hong Kong (1996a).
 29. See Hong Kong (1996a); US-AEP (1996c).
 30. Chandran Noir, ERM Hong Kong, and staff, Enviropace Hong Kong, Hong Kong (June 4, 1996).
 31. US-AEP country assessment visit conducted by John W. Butler and John J. Mapes, US-AEP (June 3-7, 1996).
 32. Fred Tromp, assistant director, Air and Noise Division, Environmental Protection Department, Hong Kong (June 4, 1996).
 33. Some of the major Hong Kong environmental NGOs include the following:
 - Advisory Committee on the Environment (ACE)
 - Private Sector Committee on the Environment
 - Friends of the Earth Hong Kong
 - World Wide Fund for Nature Hong Kong
 - The Conservancy Association: Hong Kong Environment Centre
 - Green Power
 - Green Lantau Association
 - Hong Kong Environmental Law Association
 34. Terri Mottershead, Bill Barron, Jill Contrell, and Bryan Bachner, Hong Kong Environmental Law Association, Hong Kong (June 3, 1996).
 35. Edwin C. F. Lau, assistant director, Friends of the Earth; Yan Wing L. K. Alexander, chief secretary, Green Power; Dr. N. G. Cho Nam, chairman, Conservancy Association; and Joanne Roxton, senior conservation officer, World Wildlife Fund, Hong Kong (June 6, 1996).

country
assessment:
INDIA

Prepared by:

US-AEP



UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



India

By Malcolm Forbes Baldwin

India's 936 million people constitute more than 16 percent of the world's population, yet India, at about one-third the size of the United States, occupies only 2.4 percent of the Earth's land surface. Approximately 39 percent of the population is considered "extremely poor"—with annual incomes at or below \$275* per capita—compared to China's 13 percent.¹ About 80 million people or 30 percent of the urban population live in the slums of India's twenty-three major cities. Although rich in many mineral and biological resources, India has only 0.4 percent of the world's energy reserves. India's industrial and environmental policies have been poorly integrated. Enforcement of industrial environmental standards has been weak, but community and nongovernmental organization (NGO) pressures for environmental management have affected industrial behavior at the community and state level. Market pressures for environmental management are spotty but important in some high-growth locations and some industrial sectors, such as chemicals and textiles.

1. Economic Profile

Demographic Conditions and Trends

With an annual population growth of 1.91 percent, India increases every year by the size of the population of Australia or Sri Lanka. India's population doubled in the last thirty years and is expected to surpass China's population early in the 21st century. High infant and child mortality rates affect a large portion of the population, as does child malnourishment. A declining ratio of females to males and low female literacy are endemic.

Economic Conditions and Trends

India has been likened to a "caged tiger"—in theory able to grow as fast as East Asian countries but stalled by "poor policies, overregulation, and isolation from the world economy."² India began a subtle shift away from its socialist past during the 1980s, when its economy grew at about 5.5 percent annually. Prior to those years, 3.5 percent growth was the norm; today, it is about 6 percent, although 8–9 percent growth is required for the 10 million new jobs needed each year.³ With the launching of economic liberalization in August 1991, India took unprecedented moves to curtail the licensing system by which it traditionally controlled foreign investment, encouraged import substitution, and inhibited private sector growth. Since then, a large number of multinational corporations have entered India,⁴ often despite public criticism. Nevertheless, old policies remain. Duties on capital good imports, at 50 percent, remain high by East Asian standards; energy production and distribution and other heavy industry remain state sectors. All political parties support continued subsidies for energy and water that favor farmers and the poor and markedly discourage energy and water conservation. Small enterprises have been encouraged; no public or private enterprise with more than 100 employees has been allowed to go out of business.

* Unless otherwise indicated, all dollar amounts indicate U.S. dollars.

acronyms

CPCB	Central Pollution Control Board
EIA	Environmental impact assessment
ISO	International Organization for Standardization
MOEF	Ministry of Environment and Forests
NGO	Nongovernmental organization
US-AEP	United States-Asia Environmental Partnership
USAID	United States Agency for International Development

2. Environmental Profile⁵

Industrial and Urban Environmental Management Background

India in the 1950s pursued an inward-focused, energy-intensive, heavy industry, and import-substituting development strategy. Rising international concern, development of “green” NGOs, the Bhopal disaster, and evident impacts of air and water pollution on all social strata caused India to develop an array of environmental laws and institutions that accelerated in the 1980s and continues into the 1990s. With economic liberalization, the government formulated a Policy Statement on Pollution Abatement (February 1992) to establish pollution prevention, best practicable solutions, the “polluter pays” principle, public participation, a focus on heavily polluted areas, and increased industrial safety.⁶ It sought these goals through stronger regulations and financial incentives.⁷

Environmental Conditions

Health conditions and economic productivity in India have been significantly impaired by environmental degradation. A recent World Bank study concluded that India’s annual environmental damages conservatively amounted to \$9.7 billion or 4.5 percent of gross domestic product in 1992 values, compared to 2.6 percent for China. Approximately \$7 billion of the estimate is due to water and air pollution.⁸ The following facts illustrate the problem:

Six of India’s largest cities have severe air pollution. Bombay, Calcutta, Delhi, Ahmadabad, Kanpur, and Nagpur have annual average total suspended particulates at least three times World Health Organization standards.⁹ Respiratory ailments are common; reductions to World Health Organization standards would save an estimated 37,000 lives annually.¹⁰ An ancient stock of automobiles and growing numbers of two-cycle vehicles exacerbate the problem.

Scarcity of surface and groundwater makes economic use of water “perhaps the most important challenge facing India today.”¹¹ Large government investment in surface storage and irrigation along with increasing private mining of groundwater have continued since independence.¹² Rivers that are otherwise dry, except

during the monsoon, because of upstream dams now only receive sewage or industrial waste. Widespread salinity, water logging, siltation, pesticide and fertilizer pollution in rural areas,¹³ coupled with urban household and industrial pollution result in severe health threats and daunting challenges to obtain potable or industrial water. Water use decisions have been prone to political considerations and not based on resource and river basin information.¹⁴

*Domestic sewage is the primary source of water pollution.*¹⁵ Sewerage is provided in only 20 percent of India's largest cities; even that is partial. About 75 percent of wastewater that flows into the Ganges comes from municipal sources, predominantly the largest cities.¹⁶

Industrial effluent largely comes from the 3 million small- and medium-sized units that are scattered throughout the country, particularly in production of paper, sugar, leather, and chemicals.¹⁷ Only about half the medium- to large-scale industries have partial or complete effluent treatment.¹⁸ Fourfold industrial growth in 1963–91 resulted in sixfold growth in toxic releases. Industrial chemical, iron, and steel producers contribute nearly 70 percent of the toxics released but only 20 percent of industrial output.¹⁹ Industrial disposal of polluted effluent occurs via open drains into streams and reservoirs or through underground injection.²⁰ Most industrial estates lack wastewater treatment systems.²¹

Solid waste collection and disposal systems in cities have broken down. Most cities do not keep up with the buildup of waste or have places to put it. Facilities for nonhazardous industrial waste (110 million tons a year, of which half is fly ash) and safe disposal of hazardous waste (600,000 tons a year) do not exist²²; although some companies are able to recycle or incinerate these wastes effectively, hazardous waste output is increasing from chemical, textile, and other industries.

3. Government

India has a vast governmental structure with a proliferation of government institutions at both the central and state levels. Many of its states are larger than European or other Asian nations in area and population.

Central Government

India's pervasive bureaucracy established by the British has been maintained since independence. Until liberalization in 1991, government policies and agencies banned most imports, established price controls, and discouraged foreign investment. Still-prolific regulation and licensing makes "rent seeking" a dominant feature of government life and environmental management approaches.²³

The *Ministry of Environment and Forests* (MOEF) began in the 1970s as the National Committee of Environmental Planning and Coordination, established by Prime Minister Indira Gandhi after the Stockholm Conference on Environment in 1972. The committee became the Department of Environment in 1980 and a ministry in 1985. State environmental agencies developed in parallel. MOEF (with its divisions) (a) coordinates state activities, officers, and other authorities under any law relating to environmental protection, (b) plans and monitors nationwide pollution prevention, control, and abatement programs, (c) prescribes emission standards, (d) establishes environmental standards, (e) establishes pollution restrictions for

industries, operations, and processes, and (f) prescribes procedures and safeguards for handling hazardous substances. MOEF also administers a national awards program, which recognizes environmental efforts of industry and other sectors.²⁴

The *Central Pollution Control Board* (CPCB), a statutory division of MOEF, began under the Water (Prevention and Control of Pollution) Act of 1974 and expanded under the Air (Prevention and Control of Pollution) Act of 1981. It largely executes MOEF's executive responsibilities for industrial pollution prevention and control, establishes air and water effluent and emission (concentration-based) standards for more than 500 specific industries, oversees (but does not supervise) the work of state pollution control boards, and reviews and approves environmental impact assessments (EIAs). CPCB is charged with enforcing the Water (Cess) Act of 1977.²⁵

Other MOEF-linked institutions. A number of independent, autonomous organizations work under broad policy directives from MOEF.²⁶ Several other institutions attached to various ministries and government organizations work in the environmental field.

The *Central Ganga Authority* was established in 1985 to oversee the Action Plan for the Prevention of Pollution of the Ganga developed by CPCB. The action plan is a gigantic plan to restore the water quality of India's largest river, the River Ganga (Ganges) and the subject of intense planning.

The *Ministry of Industries* has in recent years had limited engagement in environmental management. In the 1970s through the 1980s, it fostered a policy of encouraging industrial siting outside cities in backward areas and at least 25 kilometers outside major cities. It also fostered the policy of encouraging small industries. Later, the ministry articulated a policy favoring industrial estates, which never worked in backward areas. Today, this location policy is not observed.²⁷ The ministry's environment-related programs include modernizing the steel industry; updating technology information, forecasting, and assessment to make Indian industries globally competitive; and creating a pesticide development program.²⁸

The *Bureau of Indian Standards*, under the Ministry of Civil Supplies, was designated as the international organization with primary responsibility to implement ISO (International Organization for Standardization) 9000; it has been similarly designated for ISO 14000. To carry out that function, it requires certification from the Quality Council of India, an interagency autonomous body established to create national accreditation boards in testing and quality management, among other things.²⁹

Science and technology are topics of great national importance in India; the *Council on Scientific and Industrial Research*, founded in 1942, is the government agency for India's forty national laboratories. These laboratories are clustered around physical, chemical, biological, engineering, and information sciences, with a unit for corporate affairs (i.e., research and development, planning, international affairs, intellectual property, and so forth). The National Environmental Engineering Laboratory is located at Neeri; other laboratories have a greater focus on industrial sectors, such as electronics, leather, food processing and technologies, mines, drugs, steel, petroleum, buildings, glass and ceramics, and aerospace.

State Government

Environmental management powers are shifting to the states under India's federal system. The twenty-two Indian states have significant authority over water supply, solid waste management, sanitation, environmental protection, and land use and can give these powers to municipalities.³⁰ State and municipal governments are playing an increasingly significant and competitive role in economic development.³¹ Some places in India share East Asia's export orientation and have competed well; Tirupur, in Tamil Nadu, for example, now exports \$1 billion in garments each year.³² Increasingly, the key to local economic development and environmental management is provision of adequate infrastructure.

State Pollution Control Boards are in essence India's primary pollution control enforcers. They are authorized to plan, enforce, and render advice on comprehensive programs for prevention, control, and abatement of pollution. They may prescribe emission and effluent standards in consultation with CPCB; inspect equipment, industrial plants, or manufacturing processes; and require licensing of industries. State boards must seek time-consuming judicial remedies to close down polluting industries and must bear the burden of proof in demonstrating pollution violations. They may also apply to a court to restrain emissions that exceed prescribed standards. Their effectiveness has been limited by the large number of small (with revenue below Rs. [rupees] 5 million*) industries,³³ lack of technical capacity to monitor hazardous waste streams, slow response from courts on enforcement actions,³⁴ and lack of public oversight and accountability due to public information restrictions. Moreover, as the World Bank has expressed it, state boards have been plagued "by poor enforcement due to political interference . . ." whereas "[a]s with other enforcement activities in India, corruption is pervasive."³⁵ But the boards differ among the states; judicial activism and rising public and industry concern may improve their enforcement incentives (see section 4 below).

4. Policies and Laws

Environmental Policies and Laws

Policy pronouncements on environment may have arguable practical significance, but they at least reflect the direction of government thinking and the extent to which certain issues and needs are commonly recognized. The Policy Statement for the Abatement of Pollution (1992), noted above, established the central government environmental policy framework for the industrial and urban sectors. The National Environmental Action Plan prepared in December 1993³⁶ by MOEF presents India's environmental priorities and illustrates the rank and importance of industrial pollution, including the following:

- Afforestation, wasteland development, conservation of soil and moisture, and ensuring unpolluted water sources
- Conservation of and sustainable development of biodiversity in selected ecosystems
- Control of industrial and related pollution with an accent on the reduction and/or management of wastes, particularly hazardous wastes³⁷
- Improving access to clean technologies³⁸

* In January 1997, Indian Rs. 1 equaled approximately US\$0.028.

- Tackling urban environmental issues³⁹
- Strengthening scientific understanding of environmental issues⁴⁰
- Developing an alternative energy plan
- Environmental impact assessment.⁴¹

The *Eighth Five-Year Plan* (1992) outlined the goal of sustainable development and ensuring a coordinated and integrated government action plan for conserving nature and the sustainable use of natural resources. The plan adopted a liberalized economic approach by harnessing market incentives and lifting many restrictions.⁴²

Environmental Pollution Laws

India began to develop distinctive forms of environmental laws and regulations in the 1970s. The first of India's modern environmental laws was the Water (Prevention and Control of Pollution) Act of 1974, which established the Central and State Water Pollution Control Boards⁴³; the Water Cess Act of 1977⁴⁴; the Air (Prevention and Control of Pollution) Act of 1981⁴⁵; and the Environment (Protection) Act of 1986. The latter is umbrella legislation designed to provide a framework for central government coordination of the various central and state authorities established under previous laws.⁴⁶ Most recently, the Public Liability Insurance Act of 1991 requires every owner of hazardous substances to take out an insurance policy for people likely to be affected in the event of an accident.⁴⁷

Pollution laws have achieved limited success. Courts have been slow to respond to enforcement actions sought by state pollution boards,⁴⁸ the boards themselves have been poorly funded, and charges of corruption have been regular and widespread. Large industries have achieved pollution compliance more easily than small industries, which, in aggregate, pollute more (see discussion below). Some question exists on whether India's pollution control strategy and its minimum national standards are sufficiently flexible to achieve India's environmental goals with economically practical and environmentally improving measures.⁴⁹

Constitutional Provisions Affecting the Environment

India's Constitution, in effect since 1950, is an extensive document with some 400 articles and a dozen schedules of definitions and lists.⁵⁰ The fundamental right to live is guaranteed under Article 21; the Forty-Second Amendment Act of 1976 explicitly incorporated environmental protection into the Constitution.⁵¹ Article 32 allows the Supreme Court to exercise jurisdiction when any fundamental right, including the right to live and the right to a wholesome environment, is violated.

Court Decisions and Environmental Public Interest Litigation

In the 1970s Supreme Court judgments liberalized traditional constraints on standing to sue, enabling citizens to challenge government actions in the public interest, even though citizens had not suffered any individualized harm. In the late 1980s and continuing into the 1990s, the Supreme Court became active in protecting citizen rights to environmental quality in response to public interest litigation.⁵² As a result, India's Supreme Court and several of the state high courts have issued extraordinary writs of mandamus against federal and state agencies, finding, as one court expressed it, "... complete abdication of authority

by the government . . .” and directing them to close large numbers of industries for noncompliance with pollution standards as a result. The closures have alerted industry to the need for pollution controls.⁵³

Environmental Impact Assessment

The MOEF Notification of January 1994 (amended May 1994) required CPCB environmental clearance with the necessary EIA for (a) large new projects costing more than \$15 million engaged in specified activities or (b) projects by specific industries such as pesticides, mining, dye making, electroplating, foundries, or tourism.⁵⁴

Industrial Policies

In critical respects, industrial and environmental policies have not merged in India. Industries, large and small, have not been sited with environmental criteria in mind; environmental standards have not adapted to technological feasibility; and environmental impact assessment has played little or no role in decisions or plans.⁵⁵ With liberalization, as approved foreign investments grew from \$200,000 to nearly \$3 billion, large industry has become an increasingly critical part of the industrial scene; yet, popular and intellectual bias against multinational corporations appears to be widespread, based on the suspicion that multinational corporations are bringing in “dirty equipment” and not clean technology.⁵⁶

Some evidence exists that state and municipal, not national, policies will shape the pattern of industrial growth in India. More than half of industry and employment lies in five states in a belt along an industrial corridor from Ahmadabad down to Bombay along the coast, from Bombay to Hyderabad, and from Hyderabad to Bangalore to Madras. Whereas national policies once required industrial siting outside urban and agricultural areas, today, as a practical matter, the industrial states allow industries to go where they want, unless they are highly polluting. Large industries, such as the chemical industry in Gujarat, goes where a strong infrastructure and incentives exist; small industries are still encouraged in industrial estates. Increasingly, states and cities are competing for the location and composition of large industry.⁵⁷

Policies Favoring Small Industry

An ongoing debate in India, affecting the approach taken to clean production, concerns the appropriate economic and environmental policies for the estimated 3 million small- and medium-sized enterprises.⁵⁸ Government policies have been biased toward small industries as employment generators, although small industries are highly polluting in the aggregate⁵⁹ and large companies are showing increasing pollution control compliance.⁶⁰ Promotion of small enterprise is widely seen as a desirable way to achieve sustainable development; for that result, however, their pollution problems, among others, must be overcome.⁶¹

Environmental Goods and Services Industry

The Indian environmental goods and services industry is a small but growing segment of Indian industry. Some 300 firms manufacture pollution control equipment. The Confederation of Indian Industry estimates that the Indian environmental goods and services market will grow from \$2 billion in 1995 to \$5 billion by the year 2000.⁶²

Public Information Policies and Laws

India's environmental laws function under the Official Secrets Act of 1923, which established for India the British system that inhibits freedom of information to the public. It results, for example, in restrictions on the public availability of environmental pollution data gathered by the government and information on government actions concerning environmental regulations and management. The environmental documents required for new industries, such as the annual "environmental statement" required by the State Pollution Control Boards for operating industries,⁶³ are not public. As a result, these requirements are widely considered to be ineffective and often not met; yet, if this kind of information was shared with the public, it would raise the level of public understanding as well as government accountability.⁶⁴

5. Urban Environment and Infrastructure

Along with the central government, state and municipal governments are playing an increasingly important role in developing infrastructure in water supply, wastewater, solid wastes, and hazardous waste.

Water Supply

The National River Action Plan to improve the quality of twenty-eight polluted stretches of seventeen rivers has been approved by the government at an estimated outlay of more than \$300 million during a ten-year period. The National Lake Conservation Plan is a \$200 million plan that has identified twenty-one lakes for intensive conservation and management purposes. Water supply is a high priority with most state governments, but few projects have been implemented to date.⁶⁵

Wastewater

The central government is planning to spend \$200 million on wastewater projects, but for business the current wastewater market is slow, all turnkey, with no private operation and management opportunities. A basically undeveloped market for wastewater services exists throughout India. Municipalities are still at the problem-solving stage and are attempting to improve management of these basic urban services.

Solid Waste

MOEF has provided funding to seventeen cities to conduct surveys on urban solid waste disposal. Solid waste management is currently an underdeveloped market with little privatization.⁶⁶ Landfills are costly due to restricted land availability. Most nonhazardous, nonorganic solid waste (plastic, tires, metal, glass, and so forth) is sold as scrap, which is then recycled.

Hazardous Waste

Hazardous waste rules were introduced in 1989 under the Environmental Protection Act; implementation is progressing gradually. Medical waste legislation is currently in draft form. An estimated 4–5 million tons per year of industrial waste will be disposed of in landfills having an average size of 25,000–30,000 tons.⁶⁷

6. Private Sector and Academia

Industry

India has a number of NGOs dedicated to industrial development that are important to the U.S.-Asia Environmental Partnership (US-AEP). Among them are the Confederation of Indian Industry, a nationwide industry association representing large- and medium-sized firms before the Indian government,⁶⁸ the Federation of Indian Chambers of Commerce of Industry, the Association of Chambers of Commerce and Industry, and the International Environment Federation Industry Alliance. Specialized industrial institutes are often influential in fostering improved environmental management, such as the Ahmadabad Textile Industry Research Association, which serves the Indian textile industry and receives funds from the government as well.⁶⁹ Among the many important nongovernmental academic institutes, several were selected for the task of drawing up sectoral reports addressing issues under the National Environmental Action Plan.⁷⁰

Finance

India's financial system is one of the largest in the world with a variety of banking, financial, and capital market institutions and instruments.⁷¹ The combination of a high domestic saving rate (averaging 24 percent of gross domestic product in the 1990–94 period) and success in lowering inflation led to a high rate of resource mobilization. Bank deposits and corporate securities held by Indian residents now amount to 108 percent of gross domestic product, up from 19 percent in the early 1970s.

Liberalization initiatives to develop a healthy, efficient, and market-oriented financial system have created substantial change. These efforts have deregulated interest rates, developed market instruments for pricing public debt and bank loans, upgraded India's regulatory and accounting standards to international norms, gave greater freedom to banking institutions to allocate credit in accordance with market signals, and adjusted monetary policies and exchange rate management. The result has been an increasingly liberalized and open economic environment.

Closure of some large projects on environmental grounds following public litigation has convinced the two quasi-governmental banks, the Industrial Development Bank of India and the Industrial Credit and Investment Corporation of India, of the need to watch overall negative impacts of projects with hazardous operations. Litigation is also compelling financial institutions and commercial banks to anticipate environment-related default risks. In addition to the standard submission of government consent permits to industry, both institutions now require firms to furnish separate details on the nature of pollution likely to be created by the project and the control measures required.⁷²

Commercial banks such as the Indian Bank, Dena Bank, Indian Overseas Bank, and Bank of India require applicants to submit consent permits from the State Pollution Control Boards for new projects.⁷³ World Bank projects with the banking system require participating financial institutions and commercial banks to develop and incorporate an environmental risk analysis program as part of their strategic planning, human resource development, and credit risk management.

Acceleration of industrial investment and the opening up of the Indian economy allow Indian financial institutions to shape environmental decisions. Currently Indian industrial development banks have approximately \$20 billion of project financing loans outstanding. These institutions will finance that industrial changeover. They may be joined by the other national banks to the extent that they can shift from working capital to project finance lending.

7. Environmental Awareness and Public Involvement

Environmental Awareness

Environmental issues are regular but not obviously prominent parts of media attention in India.⁷⁴ The government and NGOs engage regularly in public awareness activities.⁷⁵ Opportunities to increase public environmental awareness and effective participation appear more likely through television and radio than through the print media, which is limited in the breadth of its effect due to limited literacy in the country.⁷⁶

Nongovernmental Organizations

India may have the world's and certainly Asia's largest environmental movement, led by nearly 1,000 environmental NGOs.⁷⁷ Groups range from local to national and from radical to "mainline." They are critical to environmental management throughout India, but their reach into the full panoply of environmental affairs, notably at the local level, defies brief description. Traditionally concerned with agriculture and forestry, they increasingly engage in issues of technological change and urban and industrial affairs,⁷⁸ particularly after the environmental disaster at Bhopal.⁷⁹ Activism, including highly effective legal action, has highlighted their presence in recent years. To the extent that they can be divided roughly into groups, they include (a) technologically disenchanted "greens" concerned with the "powerless" and national needs for self-sufficiency, equitable resource distribution, and traditional culture, (b) "ecodevelopers" anxious to turn development toward ecologically sustainable paths, and (c) environmental managers, who seek cost-effective environmental approaches.⁸⁰

Of the many environmental NGOs of interest to US-AEP, several have already been engaged with U.S. Agency for International Development (USAID)/India. These NGOs support civic infrastructure management, for example, Exnora, which stimulates and assists neighborhood cleanup and solid waste management in Madras.⁸¹ Development Alternatives pursues environmental management activities designed for efficiency, limited governmental requirements, sustainable financial rewards, and public engagement.⁸² The Consumer Education Research Council, whose chairman and several staff recently completed a US-AEP exchange in the United States, began as a research group and now conducts environmental research, education, public interest litigation on environmental and information topics, and consumer product testing.⁸³

8. U.S. Government Activities

U.S. Agency for International Development

USAID's multipronged approach in India is centered around economic growth, population, food security, and protecting the environment. Key programs include the following:

- The *Financial Institutions Reform and Expansion* project works to increase private investment in India's long-term debt markets with emphasis on the development of an urban environmental infrastructure finance system that is commercially viable.⁸⁴
- The *Technical Assistance and Support Project* supports a variety of grants to organizations engaged in economic policy analysis and reform.⁸⁵
- The *Program for Advancement of Commercial Technology* is designed to accelerate the pace of technological innovations in products and production processes and help build market-oriented research and development capacity in the private sector.⁸⁶
- The *Center for Technology Development* is intended to stimulate the process of technology development and commercialization by acting as a catalyst for interaction among leading representatives of industry, academia, research and development, and finance.⁸⁷
- *Trade in Environmental Services and Technology* works to address India's industrial pollution problems by fostering long-term linkages between U.S. and Indian environmental services and technology providers and consumers.⁸⁸

US-AEP Initiatives in India

US-AEP has supported 226 environmental exchanges in India, processed 154 trade leads, and sponsored 43 technology grants through the National Association of State Development Agencies, in addition to several environmental technology initiatives with the Council of State Governments. With the U.S. Environmental Protection Agency, US-AEP has also supported training and short-term technical assistance.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency has long participated in the U.S.-India Fund (or Public Law 480 Rupee Fund), which, among other things, has supported cooperative research projects in lead and manganese effects on Indian populations. The agency has programs for conducting training sessions in India on EIAs, environmental risk assessment, environmental enforcement, and pollution management. In 1996 it plans a workshop with the Government of India on common sense regulatory reinvention developments in the United States.

U.S. Department of Energy

The U.S. Department of Energy has conducted a number of technical assistance, training, and information-sharing activities in India concerned with policy, fossil fuels, renewable energy and energy efficiency, and electric power. Environmental topics have been addressed in each of these areas, many of which have been conducted at the state level.

9. International Organizations and Bilateral Assistance

World Bank

Progress in the two World Bank programs relevant to US-AEP is slow and uncertain. Two National Environmental Action Plan priorities are (a) control of industrial pollution with emphasis on reducing and managing wastes, in particular hazardous wastes and (b) improving access to clean technologies. In response, the bank authorized the Industrial Pollution Control Project and the Industrial Pollution Prevention Project, focusing more strongly on cleaner methods of production. In addition, the bank is helping India establish a clean technology institutional extension service for identifying waste minimization and abatement methods for small-scale industries, pre-investment studies, and training and consulting services for planning by MOEF.⁸⁹

On the policy front, the bank has been pursuing a \$50 million program for environmental policy development, environmental economics, and institutional support for the Confederation of Indian Industry in India. It has confronted significant barriers in terms of lack of interest and capacity to develop programs.

Asian Development Bank

It is expected that by 1999, 50 percent of Asian Development Bank projects will focus on specific states in India. Gujarat will be the first of the states to receive the bank's support directly. This support will be holistic in its approach, covering major infrastructure needs such as power, ports, and roads. The first loan is expected to be a structural adjustment loan—a fast-dispersing loan based on tranches released after progress has been made. The shift is due to the bank's status as a small player when compared to others such as the World Bank and a sense that its smaller resources are better focused regionally than nationally. Second, as concerns about the future of India's economic liberalization have subsided, the Asian Development Bank will focus on assisting economic liberalization at the state level following the Government of India's movement and planning in this area.

Western Governments

The Environmental Protection, Training, and Research Institute in Hyderabad is being upgraded with financial assistance from the Swedish government. Norway is providing financial assistance to the State Pollution Control Boards of Uttar Pradesh and Orissa on the monitoring of fluorine emissions. Denmark is assisting with an environmental master plan study for the South Kannara district. It will also assist the environmental training institutes in Tamil Nadu and Karnataka. Australia is appointing contractors for drawing up a detailed engineering design for a project on waste management technology for Hussain Sagar, Hyderabad. Pending bilateral arrangements include the United Kingdom, Germany, Russia, and Canada.

Japan

In terms of Japan's official development assistance, India ranked as the fifth largest recipient of bilateral aid in 1993; India received \$295.94 million that year. Most aid was in the form of loans, totaling \$247 million.⁹⁰ During the five-year period of 1989–93, Japan's official development assistance to India has fluctuated from a low of \$87 million (1990) to a high of \$852 million (1991).

10. Opportunities to Support Clean Production and Environmental Management

Policy Framework

Public awareness and participation. India shows strong evidence of heightened awareness and pressure for environmental quality from the nongovernmental community and the courts. Concern for public information sharing could strike a strong chord in India. The assessment team found considerable interest in U.S. Environmental Protection Agency and state experience with environmental reforms spawned by public availability of information on pollution discharge, environmental impact assessment, and risk assessment.⁹¹ Broader and more systematic environmental information availability to the interested public in India could greatly enhance demands for moves toward ever cleaner technology and production processes; it could also help address underlying concerns about the environmental impacts of large corporations as well as actions (or inactions) by government agencies.

Environmental policy and regulatory reform. Opportunities for engagement in the policy and regulatory arena are circumscribed by resource or other institutional constraints within public institutions. Despite some interesting analytical work within CPCB and sister organizations at the state level, broad-scale cynicism and pessimism exists within India and the donor community on effective implementation of existing environmental regulatory (i.e., command and control) and management systems in India.⁹² One basic, ongoing, and politically difficult task concerns full-cost *resource pricing*. Resource pricing reform in both the energy and water sectors could be the single most important policy target for moving an environmental agenda in India.

The US-AEP assessment team identified needs and opportunities to *support Indian efforts to establish the opportunity costs to the environment of present industrial/urban policies*. Examples are policies that restrict trade and competition and subsidize energy and water use. These costs appear high, but they have not been addressed in analyses of environmental degradation costs carried out by the World Bank.

A related topic concerns *targeted fiscal incentives*. India has a set of fiscal incentives to promote environmental quality at the firm level. Although we were not able to assess the effectiveness of the incentives, anecdotal evidence exists that they work only at the margin and often overlap with an even larger set of incentives for a variety of different (and sometimes contradictory) objectives.

Industrial Environmental Management

Technology transfer. India is more internally focused (i.e., more isolated, perhaps by choice, from the world) than other countries in Asia. Although a number of intermediary instruments exist (e.g., the Trade in Environmental Services and Technology project, Department of Commerce/US-AEP technology representation, and so on), few foster long-term cooperative relationships (e.g., between the Air and Waste Management Association and local counterparts). In addition, too little information is available about technological alternatives, despite several promising opportunities. But India has a large capability for science and technology research and development and a substantial capital goods industry; it has a clear policy preference for Indianization in this arena. Technology transfer in terms of sales to end users

is important but insufficient. Signal opportunities exist to promote collaborative research and joint ventures among equipment suppliers and to license hardware. The possibility also exists for mutual advantage in linking India into the global technology system, most desirably through links with the United States.

Environmental principles for industrial growth. India, like other countries, would benefit from the ability to gauge the intensity of industrial pollution for industry's own standard-setting and government enforcement. Firms could then apply these standards to make informed technology choices and monitor their own performance and compliance.⁹³ Counterparts for collaboration can be found within the industrial research community and among business and industrial associations. The Confederation of Indian Industry has expressed interest in working on this topic.

Voluntary standards. Perhaps the most important impetus for environmental quality within India's industrial regime will be pressure from the ISO 14000 international environmental standard (particularly as it affects export industries).⁹⁴ Although some activity to tackle ISO 14000 and inform industry about environmental management systems is already occurring within industry associations, stronger national support is necessary to make ISO 14000 an effective incentive.⁹⁵ Counterparts for collaboration can be found in the government's standards agencies (e.g., the Bureau of Indian Standards and the Quality Council of India) and among business groups, such as the Association of Chambers, Confederation of Indian Industry, Federation of Indian Chambers of Commerce of Industry, and other industry-specific organizations.⁹⁶

Greening the supply chain. A related pressure favoring clean production from international standards is reflected by the movement to "green supply chains." This development reflects the incorporation of environmental concerns within quality standards, movement to organize manufacturing networks, and globalization of business. The US-AEP assessment team identified three program possibilities for India: (a) work with U.S. multinational corporations and larger Indian companies to advance the idea in India, (b) work with related industrial associations to strengthen members' ability to respond to requirements of multinational corporations and large Indian firms, and (c) use these companies to provide pro bono technical assistance and training to their suppliers. The principal counterparts for collaboration will probably be found among specific firms (e.g., Tata Exports), larger houses (e.g., Larson and Tubro), multinational corporations (e.g., General Motors and Motorola), and business groups, such as the Association of Chambers, Confederation of Indian Industry, and Federation of Indian Chambers of Commerce of Industry).

Environmental due diligence. The Bank of Baroda is actively seeking to improve its environmental consulting capabilities.⁹⁷ The principal counterparts for collaboration may be found among specific banks (e.g., Bank of Baroda), industry associations (e.g., banking and insurance industry associations in India), educational and training organizations (e.g., those institutions specifically geared to the financial sector), and business groups (e.g., the Association of Chambers, Confederation of Indian Industry, and Federation of Indian Chambers of Commerce of Industry). Vigorous efforts by lending institutions to improve their understanding of environmental risks and liabilities could be an important impetus to increased public disclosure of environmental information by the government.

Industrial extension. USAID experience with capacity building puts a premium on “training of trainers.” This is particularly important in India, where issues of scale threaten the reach of any capacity-building intervention. An analogous approach is to develop an industrial extension system to intermediate organizations whose self-interest depends on an industrial regime dedicated to clean technology.

Environmental Infrastructure

Expanding markets. The market for water, wastewater, and solid and hazardous waste infrastructure in India is currently estimated at more than \$500 million and is expected to reach \$4.5 billion by 2005. The central government remains the major buyer and driving force behind this market. Rising public and NGO awareness of domestic pollution and its adverse impacts on health will impel increasing government as well as private investment in environmental infrastructure projects. Encouraged by new liberalization laws, foreign investment is coming into India from Europe, Japan, Canada, and Australia. The United States has historically been India’s largest trading partner and provided the largest investments; hence, U.S. technology and equipment are readily accepted in India.

Management needs of municipalities. The brunt of the demands for environmental infrastructure development will fall on municipalities. Throughout India an increasing need exists to help build their capacity to plan, finance, operate and maintain new infrastructure investments. They also need continuous information and guidance on the types of technologies available and appropriate to local conditions and the levels of service required. In 1997 USAID’s Regional Housing and Urban Development Office in India and US-AEP will hire an Urban Environmental Infrastructure Representative to provide municipal governments and private project sponsors with technology advice, information on twinning with U.S. municipalities, and project advisory services. This effort will also relate to the Regional Housing and Urban Development Office’s Financial Institutions Reform and Expansion program and utilize other U.S. government resources, including Department of Commerce advocacy and complementary programs from the U.S. Trade and Development Agency, EXIM Bank, and the Overseas Private Investment Corporation.

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Endnotes

1. World Bank (1996).
2. USAID/India (1995, 4).
3. V. Raghuraman, secretary general, Association of the Chamber of Commerce and Industry, Delhi (April 30, 1996).
4. Coca Cola is now prolific; IBM, Kellogg, Corning, Motorola, and many other multinational corporations operate in India. Dupont moved a new nylon plant to Madras, where General Motors is also establishing a new factory.
5. Readers should note that this brief assessment could not attempt to put India's industrial environmental problems in comparative context with other daunting impacts of agricultural, forestry, energy, and other activities that significantly affect India's environmental conditions and trends.
6. World Bank (1996a, 143).
7. Some major incentives include a depreciation allowance of 30 percent on pollution reduction or natural resource conservation devices or systems, investment allowance of 35 percent for specified equipment that will control pollution or protect the environment, capital gains tax exemptions for transferring buildings away from congested urban areas, and certain excise tax exemptions for specified materials, machinery, and components (World Bank 1996a, 144).
8. The valuation did not include estimates for the impacts industrial hazardous waste, loss of biodiversity and habitat, impacts on coastal and marine resources, and costs of providing clean water. See Brandon and Hommen (1995).
9. Delhi, Calcutta, and Kanpur have values five times the World Health Organization standard (World Bank 1996a, 193).
10. World Bank (1996a, 194), citing a report by the Central Statistical Organization, Government of India, 1992.
11. World Bank (1996a, 118).
12. Rs. (rupees) 360 since 1950 (World Bank 1996a, 118).
13. Chemical inputs in agriculture rose from 1.9 kilograms per hectare in 1981 to 80 kilograms per hectare in 1995 (Environmental Management Division, Confederation of Indian Industry, New Delhi [April 1996]).
14. World Bank (1996a, 120).
15. World Bank (1996a, 103, 116), citing a report on the Ganges. Most pollution from urban areas is from nonpoint sources.
16. The World Bank estimates that no adequate collection system exists for 95 percent of the wastewater in urban cities. Of the less than half that is collected in the major cities, less than half of this is subject to any treatment (World Bank 1996a, 7).
17. World Bank (1996a, 102).
18. World Bank (1996a, 102).

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19. World Bank (1996a, 139).
20. Prof. Prem Pangotra, Industrial Institute of Management, Ahmadabad (May 1, 1996).
21. The World Bank–financed Industrial Pollution Control Project has financed the design and implementation of seventeen common effluent treatment plants (World Bank 1996a, 166).
22. K. P. Nyati, Confederation of Indian Industry, New Delhi (April 30, 1996).
23. The British system required rigorous civil service training, supervision, and extensive controls by a distinct administrative class. The Indian government today maintains the civil service system, but ministries and agencies have proliferated and their financial resources are now vastly reduced.
24. Among the awards are the National Award for the Prevention of Pollution, the Rajiv Gandhi Environment Award for Clean Technology, and the Pitambar Pant National Environment Fellowship Award.
25. For a summary of the state and federal environmental laws and regulations affecting industry, see CII (1995).
26. These include the Environmental Protection, Training, and Research Institute; the Pollution Control Research Institute; the National Landuse and Wasteland Development Council; and the National Wastelands Development Board.
27. Barjor E. Mehta, director, School of Planning, Centre for Environmental Planning and Technology, Delhi (May 9, 1996).
28. The growing role of the states and municipalities in industrial development, siting, and regulation makes the Ministry of Industries an increasingly weak player in the environmental and industrial policy and program implementation arena.
29. Emphasizing the dominant European role in certification for ISO 9000, ten organizations now operate as certifiers in India, with 1,800 facilities certified as ISO 9000 compliant. Besides Bureau of Indian Standards, two certifiers are Indian governmental bodies and the other seven are European private sector organizations (industry representatives, New Delhi [May 1996]).
30. See the Constitution (Seventy-Fourth Amendment) Act, 1992. The 74th Amendment to the Constitution and the “Twelfth Schedule” give states additional authority over, among others, urban planning, land use, and building construction; economic and social development planning; water supply; public health, sanitation, and solid waste management; and protection of the environment. It authorizes states to delegate these powers to municipalities, along with the power to levy taxes, duties, and fees.
31. Barjor E. Mehta, director, School of Planning, Centre for Environmental Planning and Technology, Delhi (May 9, 1996).
32. R. M. Subramaniam, executive secretary, Tirupur Exports Association and Tirupur Export Knitwear Industrial Complex, Madras (May 6, 1996).

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33. In the state of Gujarat, for example, 6,000 of 15,000 industries are polluters. The Gujarat Pollution Control Board has a staff of 350, with five regional offices, each with three to four engineers. It conducts 20,000 inspections a year from the regional offices. The High Court recently ordered the board to hire another 170 staff (K. D. Rathod, member secretary, Gujarat Pollution Control Board, Gujarat [May 2, 1996]).
 34. The Gujarat Pollution Control Board, for example, has taken 2,569 cases to court, 109 in 1994–95. Of the total, some 1,537 cases, mostly water related, are still pending in the courts (GPCB 1995, 38).
 35. World Bank (1996a, 145). Assessment team interviews in India corroborated this conclusion from every quarter.
 36. See India (1993). The National Environmental Action Plan built on previously announced policies, including *The National Water Policy* (1987) and *National Landuse Policy* (1988), which recognize the importance of maintaining ecological balance and seeking sustainability of water use and investments for development of water resources. The National Environmental Action Plan closely followed preparation of *The National Conservation Strategy and Policy Statement on Environment and Development* (1992).
 37. Included under this objective are modernization of cleaner production in leather, textile, and paper and pulp industries; research on natural dyes; quantification of pollutants from nonpoint (agricultural fields, waste disposal sites, leaky septic systems, mining and logging, and so on) sources; physical methods for ascertaining the role hydrology plays in influencing pollutant behavior; decision-oriented methods regarding nonpoint pollutant sources; technologies for control of nonpoint pollution; cost-effective water treatment technologies; wastewater treatment recycling and reuse technologies for water conservation; and least hazardous methods for mining.
 38. Included under this objective are research and technology development under the National Materials Initiative under the Industrial Development Programme for raw material upgrading; Technology Mission on Cleaner Production to promote cleaner technologies; industry-specific task force for selection of demonstration/ development projects; identification of cleaner technologies developed in India and abroad and facilitation of technology transfer/adaptation; centers for cleaner technologies for developing a central data base and providing information to industries; formulation of standards for waste discharge per unit quantity of raw material; formulation of legal and economic measures to ensure absorption of clean technologies; and capacity building for EIA of clean technologies.
 39. This objective includes various activities relevant to US-AEP, including among many other examples: programs to strengthen the Building Materials and Technology Promotion Council, reduce solid waste generation, provide fiscal instruments for waste minimization regarding nonbiodegradable and nonrecyclable packaging materials, and develop biodegradable packaging materials through the Eco-Mark scheme.
 40. Included in this objective are regular and sustained environmental education programs for professionals, decisionmakers, and local self-government authorities in EIA.
 41. Included in this objective is the plan to establish a National Center for Long-Term Training on EIA and evolve a network of regional centers in various institutes for training in preparation of EIA reports, including Disaster Management Plans.

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42. The plan placed the manufacturing sector at the center of industrial growth and stressed consideration of increased waste and pollutant outputs. It outlines an emphasis on expanding the export market through various mechanisms, including adoption of ISO 9000 protocols.
43. The Water (Prevention and Control of Pollution) Act of 1974, *as amended* applies to streams, inland waters, subterranean waters, and sea and tidal waters. The Water (Prevention and Control of Pollution) Cess Act of 1977 was passed to meet the expenses of the Central and State Pollution Control Boards. The Indian Penal Code (Section 277) provides that anyone who voluntarily corrupts or fouls the water of a public spring or reservoir shall be fined up to Rs. 500, jailed up to three months, or both.
44. The act was designed to allow the central and state water boards to levy a tax on specified industries credited to a consolidated fund. Rebates of 75 percent of the tax are designed to create incentives for those installing sewage or effluent treatment (Ramakrishna 1985, 924).
45. The Air (Prevention and Control of Pollution) Act of 1981, *as amended*. Parliament enacted the Air Act to implement the decisions taken at the United Nations Conference on Human Environment held in Stockholm in June 1972. It expanded the authority of the central and state boards, which were established under the Water (Prevention and Control of Pollution) Act, 1974. The 1987 amendment strengthened the enforcement machinery and introduced stiffer penalties. The Indian Penal Code (Section 278) provides that anyone who intentionally vitiates the atmosphere to make it noxious to health shall be punished by imprisonment of up to three months and fined up to Rs. 500, or both. The Motor Vehicle Rules of 1989 impose tailpipe emission standards.
46. Environment is defined to include water, air, land, and the interrelationships that exist among them as well as between them and human beings, other living creatures, and property. The Environment Act is also the first environmental statute granting authority to issue direct orders to close, prohibit, or regulate any industry, operation, or process.
47. Reimbursements of medical expenses of up to \$400 or \$800 for fatal accidents must be paid within thirty days of an accident. The Hazardous Wastes (Management and Handling) Rules of 1989 includes waste materials not covered by the Atomic Energy Act, Merchant Shipping Act, and Water and Air Acts. The rules do introduce a permit system to regulate the handling and disposal of wastes and fixes responsibility on the person generating wastes. The Manufacture, Storage, and Import of Hazardous Chemicals Rules of 1989 covers the handling of hazardous substances other than wastes. The Factories (Amendment) Act of 1987 passed soon after the Bhopal tragedy, introduced special provisions on hazardous industrial activities.
48. For example, of the 2,008 cases submitted under the Water Act by the State of Gujarat Pollution Control Board up to April 1995 (which constituted 80 percent of all cases filed), 1,330 were at that time still pending. Yet only 95 of these had been filed during 1994–95. See GPCB (1995, 38).
49. A World Bank report raises the question of whether the industrial source performance standards are set at levels requiring maximum effluent reductions that are at or near what is technically achievable. Space constraints may make achievement of minimum standards infeasible for many industries, yet minimum standards cannot be reduced (World Bank 1996b, 87, and box 3.7).
50. Ramakrishna 1985, 909.

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51. "The State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country" (Article 48A). "It shall be the duty of every citizen of India . . . to protect and improve the natural environment including forests, lakes, rivers, and wildlife and to have compassion for living creatures" (Article 51A).
 52. As cited by the State of Gujarat's High Court (1995 [2] Gujarat Law Herald 352) in *Pravinbhai Jashbhai Patel et al. v. State of Gujarat* and the Supreme Court in *M. C. Mehta v. Union of India* (AIR 1988 SC 1037), *Virender Gaur and Ors. v. State of Haryana & Ors.* (1995 [2] SCC 577), and *C.E.R.C. v. Union of India* (AIR 1995 SC 922), courts have held that persons who suffer as a result of this water and air pollution can justifiably contend that the fundamental right to live under Article 21 of the Constitution is violated.
 53. The High Court of the State of Gujarat, for example, has maintained daily supervision of the State Pollution Control Board and monitoring of the industries ordered closed and seeking to commence production; however, it is unclear how sustainable these court actions are given the demands on the court's time and resources, even with the development of special environmental courts. Rigorous administrative monitoring and routine enforcement remains problematic (Gujarat State Pollution Control Board, Gujarat [May 1996]).
 54. The procedural steps for obtaining the necessary environmental clearance are displayed and explained in CII (1995).
 55. See *Indian Environmental Society* (1992, 158). A project on siting and location of industries in the natural and built environment, supported in part by USAID India.
 56. Observations from assessment team in India from extensive government and industry interviews (May 1996).
 57. Barjor E. Mehta, director, School of Planning, Centre for Environmental Planning and Technology, Delhi (May 9, 1996).
 58. Small companies are defined as those with less than \$180,000 in capital equipment. Approximately 40 percent of India's exports come from small companies (K. P. Nyati, director, Environmental Management Division, Confederation of Indian Industry, New Delhi [May 5, 1996]).
 59. Small industries lack environmental commitment, technical expertise in environment, and financial capabilities to address environmental problems; nor do they have standards or effective treatment opportunities and services. The government's Policy Statement for Abatement of Pollution seeks to encourage use of combined treatment facilities for small industries. See *India* (1991).
 60. The government has targeted seventeen industries for special monitoring and enforcement; twenty-two areas have been designated as critically polluted. Of the 1,500 facilities in these industries, fewer than 10 percent had installed pollution control equipment by the end of 1991, rising to 65 percent two years later (World Bank 1996a, 78).
 61. See *Development Alternatives* (1992).
 62. CII (1996).
 63. These must be filed by September 30, along with the required financial statements (CII 1995, 43).

Endnotes

64. At present, strict guidelines do not exist on who is a competent professional to carry out EIAs. EIAs are done by private consulting firms to fulfill requirements to obtain environmental clearances. Interviews conducted in Delhi, Ahmadabad, and Madras (April 27–May 11, 1996) with government, business, and NGO representatives support the conclusion that EIAs could be considerably more useful if they were public documents prepared earlier in the planning process.
65. In the Ganga Action Plan Phase I, \$180 million has been spent since 1986 to improve the quality of the river Ganga. In phase II, Japan has provided \$125 million to improve the quality of the Yamuna and Gomti rivers. All project feasibility reports have been approved (US-AEP 1996).
66. The private sector (Western Paques and Excel) has entered into disposal of solid waste, generating organic manure and electricity in fifteen to twenty cities. Private and community involvement has occurred in solid waste management through management contracts, for instance, by Exnora International in Madras and others in Baroda, Rajkot, Hyderabad, and Bangalore.
67. By 1998 the following incinerators are expected to be commissioned: three to eight incinerators of 150 metric tons per day, eight to ten incinerators of 50 metric tons per day, and fifty incinerators of 5 metric tons per day. It is frequently the case that hazardous waste is mixed with municipal waste. Indian companies are ready to invest in the hazardous waste market; foreign investors have started to come forward. A \$20 million facility is being negotiated in Madras with two U.S. companies, International Technology Corp. and Fuller Co., and an Indian affiliate, Fuller KCP. A small emerging market exists for defined projects (US-AEP 1996).
68. About 44 percent of the Confederation of Indian Industry's more than 6,000 firms are small- and medium-sized enterprises. The confederation has an Environmental Management Division designed to help make industry "eco-efficient," which works in partnership with government, including membership on India's National Environmental Council; the government's Environmental Clearance Committee, which clears new investment; and others. Working with the Regional Institute of Environmental Technology in Singapore, the Environmental Management Division has carried out training programs for environmental auditors. The confederation was the first to conduct a small number of audits, which it used as the basis for its 100 training programs. Today, some 300 individuals or firms conduct environmental audits. The confederation has also worked with small- and medium-sized enterprises to develop new proposals for clean technology (Confederation of Indian Industry, New Delhi [May 5, 1996]).
69. The Ahmadabad Textile Industry Research Association has a voluntary membership of companies in the die stock, machinery, and related textile businesses and instrument makers, including members outside India.
70. Those responsible for topics that are particularly relevant to US-AEP include the following:
 - *Indian Institute of Public Administration*. Institutional structures for environmental management and environmental education.
 - *Indian Institute of Technology*. Environmental impact assessment.
 - *Indira Gandhi Institute of Development Research*. Natural resource accounting.
 - *Madras Institute of Development Studies*. Urban environmental management.
 - *National Environment Engineering Research Institute*. Water quality.
 - *Tata Energy Research Institute*. Alternative Energy Action Plan.

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71. Twenty-three of 275 commercial banks are foreign.
 72. Environmental awareness and staff experience are increasing in both institutions. The Industrial Development Bank of India and Industrial Credit and Investment Corporation of India have integrated environment as an appraisal function in the different project-financing departments. They have set up environment cells as part of their technology divisions. The EXIM Bank wholly serves the export community, requires proponents to obtain environmental clearance, and in the past has financed pollution control measures as part of project financing (e.g., leather tanning) (representatives of Indian banks and financial institutions, Bombay and New Delhi [May 1996]).
 73. The current practice is that financial institutions and commercial banks require financing to obtain valid consents under environmental clearance prior to sanctioning term assistance. Reliance is placed entirely on the approvals by environmental regulating agencies (representatives of Indian banks, New Delhi [May 1996]).
 74. Former Union Minister for environment Maneka Gandhi expressed her disappointment at the inadequate media coverage of issues relating to the environment and animal welfare. Gandhi made her remarks at a Madras symposium in January 1996. As an example, Gandhi noted that villagers in Rajasthan poisoned area water ponds to kill predatory animals, such as the tiger, which preyed on their goat herds. The incident went unreported in the news media, although they were aware of the problem. (See *The India Information* 1996). During the May 1996 election, the US-AEP assessment team noticed a complete absence of any environmental issues in the campaign.
 75. MOEF has launched a National Environment Awareness Campaign centered around the themes of joint forest management, ecodevelopment, and the Montreal protocol. Nearly 2,200 organizations comprising NGOs, schools, colleges, universities, research institutions, women and youth organizations, and so on are supported to organize on a variety of activities intended to create public environmental awareness.
 76. India is hampered by a literacy rate of 52 percent for ages 7 and older (64 percent male/39 percent female), as well as low annual income per capita (one of the lowest in the world) and a small middle class.
 77. See Peritore (1993), 807.
 78. Examples of Indian NGOs in the environmental field include the following:
 - *Indian Council on Enviro-Legal Action* was founded by former Supreme Justice P.N. Bhagwati and the environmental lawyer, M. C. Mehta who has won a series of judgments against industries and municipalities that are polluting the Ganges River and the air that damages the Taj Mahal. The council was established to train lawyers and broaden the scope of existing efforts. In 1994 the council was asked to become the home of the Environmental Law Alliance Worldwide (E-LAW) in India.
 - *Narmada Bachao Andolan*. Led by Medha Patkar, this coalition of more than 200 groups opposes the Narmada Dam scheme and has repeatedly lobbied the World Bank to cease funding the project. Its largest demonstration involved 50,000 people in Harsud, Madhya Pradesh, in September 1989.

Endnotes

- *The Chipko Movement*, formed in 1973, is a grassroots organization that runs camps to teach students and villagers about environmental issues. They are best known for their opposition to the Tehri Dam near its base at Garhwal in the Himalayas. It is headed by Sunderlal Buhuguna.
 - *Kerala Sastra Sahitya Parishad*, formed in the late 1950s, claims several thousand members across fifty units in the state of Kerala. It has campaigned on environmental issues—notably the Silent Valley hydroelectric project—and has a wider role to educate people about science, health, and social issues through art and theater.
 - *Center for Science and Environment*, based in New Delhi, is India's main environmental research and information dissemination organization. Publications include state of the environment reports and numerous books and pamphlets. Led by Anil Agarwal, the group believes in the rights of developing countries to decide economic policy without having conditions imposed on them by Western donor countries or lending agencies.
 - *Kalpavriksh*. Formed in 1979 in response to the impending destruction of "The Ridge" greenbelt area in Delhi, the group now campaigns on a wide range of issues. It has issued writs against several polluting factories and mines, runs education programs in schools, carries out research into conservation and pollution problems, and publishes newsletters. The group believes that environmental problems arise from sociopolitical structures and ethical standpoints and their solution requires societal and moral changes. The name denotes a mythical Indian tree that provided everything one could wish for.
 - *Indian National Trust for Art and Cultural Heritage*. Although not solely an environmental group, the trust has an environmental section and carries out research into a variety of issues. In recent years, it has produced detailed reports arguing that both the Narmada and Tehri dams are ill-conceived on economic as well as environmental grounds. The organization is publicly funded.
 - *The Save Bombay Committee*. Founded in the mid- 1970s, the committee fights on similar issues as the Bombay Environmental Action Group (see below). Both organizations' campaigns largely cover issues *outside* of Bombay.
 - *The Bombay Environmental Action Group*. Originally a subcommittee of the Save Bombay Committee, this group was formed in 1977 to fight a proposal to locate a major fertilizer plant/petrochemical complex/industrial zone at Rewas-Mandwa, a greenbelt area of farmland in the southern reaches of the greater Bombay metropolitan region. The Bombay Environmental Action Group, unlike the Save Bombay Committee, works with national, state, and local governments and tends to be less confrontational.
79. On the night of December 2, 1984, an emission of methyl isocyanate gas from the pesticide plant of Union Carbide India at Bhopal killed more than 6,000 area residents and affected nearly 600,000 people who have now filed claims for compensation. Government response was immediate with the passing of the Bhopal Gas Leak Disaster (Processing of Claims) Act in 1985 and later the Supreme Court decision awarding \$470 million to the victims of the disaster.

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80. N. Patrick Peritore's division, based on an Indian attitude survey, as described in Peritore (1993).
 81. Exnora International is an NGO whose objective is to promote community-level or street-level organizations called Civic Exnoras that work for neighborhood cleanup through resident participation. Solid waste management, waterway monitoring, tree planting, slum improvement, and environmental education in schools are key aspects of the program. Exnora, which operates largely in Madras, now has nearly 3,000 of these Civic Exnoras in Madras and elsewhere. In Madras these groups are responsible for handling approximately 20 percent of the city's solid waste collection and disposal. USAID has provided limited financial support to Exnora and substantial and much-needed and appreciated moral support, advice, and encouragement (M. B. Nirmal, chairman, and T. K. Ramkumar, advocate, Exnora International, Madras [May 6, 1996]). For information on its program, see Exnora International (N.d.).
 82. Ashok Kosla, chairman, Development Alternatives, New Delhi (May 7, 1996).
 83. The Consumer Education Research Council began in 1978 with a staff of six and now has a staff of seventy-five with an annual budget of Rs. 7 million. Its environmental division engages in public awareness and education programs. The council's legal staff has engaged in public interest litigation in Gujarat and before the Indian Supreme Court; it is taking the lead in developing a freedom of information act in India (Professor M. Shah, managing trustee, Ahmadabad [May 1, 1996]; Rani Advani, advocate, Consumer Education Research Council, Washington, D.C. [June 6, 1996]).
 84. The life of the project is 1993–99, supported by \$20 million direct assistance and \$125 million housing guaranty funds. The Regional Housing and Urban Development Office manages the debt market development component of the Financial Institutions Reform and Expansion project. Housing guaranty funds, training, and consultant assistance are used to (a) increase capacity of the debt (e.g., bond) market to serve as a major private-sector urban infrastructure finance source, (b) increase local government capacity to plan, operate, maintain, and recover costs of basic urban infrastructure projects, and (c) increase trading volumes of debt instruments and introduce new financial instruments.
 85. Sample grants include \$1.1 million to the Federation of Indian Chambers of Commerce of Industry for economic growth policy seminars, \$580,000 to the International Center for Economic Growth for distinguished author seminars and collaborative economic policy research, \$108,000 for a privatization seminar with the federation to introduce a select Indian audience of policy makers to the fundamental concepts of privatization, \$1.2 million for an Automation of Water Treatment Plant Pilot Demonstration activity, \$208,000 for new research techniques and information technology for urban resource management with the National Institute of Urban Affairs, and \$45,000 for a case study of the River Ganga with the Sankat Mochan Foundation. The life-of-project cost (1988–98) is \$20 million.
 86. Implemented by the Industrial Credit and Investment Corporation of India, technology development projects include edible oil recovery, biopesticides, irrigation pumps, engineering, energy, tissue culture, pollution control, and pharmaceutical and information technologies. The life-of-project (1985–95) cost is \$21.02 million.
 87. Center for Technology Development focus groups have been established in informatics, food processing, dryland development, and new materials. The center's activities are currently limited to Karnataka state. The life-of-project (1989–98) cost is \$10 million.

Endnotes

88. The Trade in Environmental Services and Technology project provides funds (loans and conditional grants) to support sound environmental investments, technical assistance, trade and investment tours, information networks, promotion and environmental services and technology sector activities of trade and professional organizations, and implementation of development finance institutions. The life-of-project (1992–97) cost is \$25 million.
89. A project currently under consideration for fiscal 1996–97 is the Hazardous Waste Management Project.
90. Notable projects included the Anpara Thermal Power Construction Project, Small-Scale Industries Development Program, Faridabad Gas-Based Power Station and Associated Transmission System Project, and Bakreswar Thermal Power Station Project.
91. The experience and interest of the U.S. Environmental Protection Agency in these topics in India can be applied to training programs and information exchange.
92. The U.S. Environmental Protection Agency has opened new opportunities to address these problems with its planned workshop in India on common sense regulatory reinvention developments in the United States.
93. Ambient measures are inadequate measures of industrial pollution progress because measures may decline or improve without any relation to pollution intensity, for example, because of a shift away from or export of dirty industries. Pollution intensity indexes are a more absolute guide to incorporating environmental quality goals in industrial policy.
94. Other important opportunities in the area of voluntary standards include industrial codes (e.g., “responsible care” in the chemical industry) and business charters (e.g., the Business Charter for Sustainable Development).
95. The assessment team is aware of strong sensitivities within the Indian government and business to the growing role and increasing requirements of the international marketplace. These are concerns that any US-AEP program will need to accommodate with care.
96. US-AEP resources include arrangements with Louis Berger International, the Environmental Exchange Program (International Institute of Education), and pending agreements with different industrial sector organizations (e.g., the Chemical Manufacturers Association).
97. In addition to the major commercial and project financing institutions, opportunities may also exist with state development banks. American banking institutions in Mumbai also have indicated their willingness to provide technical assistance.

country
assessment:
INDONESIA

Prepared by:

US-AEP



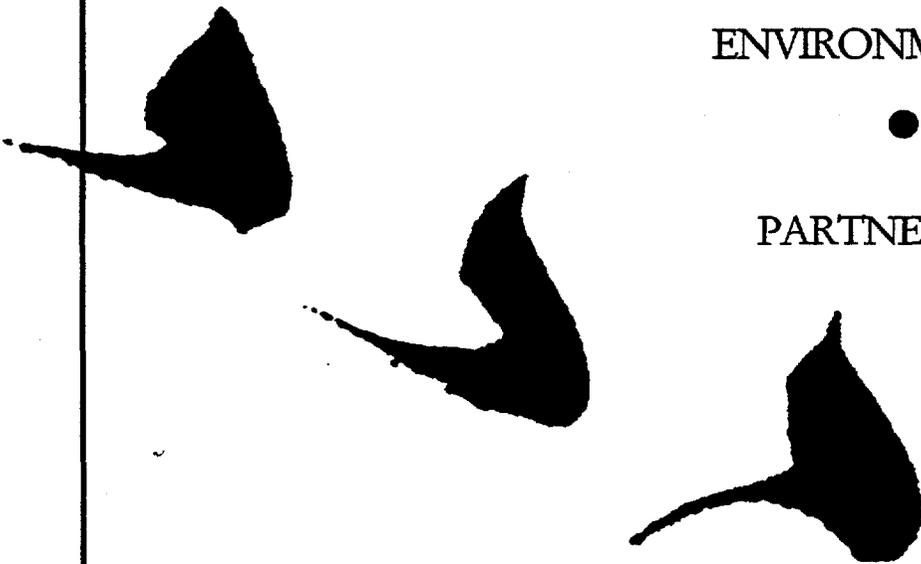
UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



1/6/87

Indonesia

By John Butler

Indonesia is an archipelago of more than 13,000 islands, stretching across an expanse of more than 3,000 miles. With a population greater than 200 million, Indonesia is the fourth most populous country in the world. Once one of the poorest countries in the world, the nation has experienced exceptional economic growth, raising its annual per capita income from \$50 in 1967 to one approaching \$1,000 today. With rapid growth in the industrial sector have come quickly rising levels of pollution. Although Indonesia does not have a strong base of civil law, Indonesia's environmental agency is nevertheless aggressively pursuing innovative environmental policies that transcend command and control approaches to address this rapid growth; however, the central industrial and economic planning ministries of the Government of Indonesia (GOI) have not integrated environmental concerns into their policies and programs. Although public information on environmental matters is extremely limited in Indonesia, the country's numerous nongovernmental organizations (NGOs) are actively engaged.

1. Economic Profile

Demographic Conditions and Trends

Living standards in Indonesia have markedly improved in the last 25 years. In 1967 an estimated 60 percent of its population—at that time, 115 million people—lived in absolute poverty; life expectancy was well below that of developing countries as a whole, whereas the infant mortality rate was significantly higher. Indonesia also lagged behind other developing countries in education and had a much higher adult illiteracy rate than those of its neighbors. Population growth, at 2.4 percent annually, was a major concern.

Today, the poverty rate stands at 15 percent (for its much larger population of more than 200 million) and, according to the World Bank,¹ Indonesia has had the highest annual average reduction in poverty during the last two decades of all countries studied. Infant mortality rates have been cut by more than 70 percent during this period; average life expectancy has risen by almost 50 percent. The adult illiteracy rate has fallen by nearly two-thirds.²

Indonesia's population growth has been dramatically reduced through GOI's vigorous family planning policies and is now at 1.6 percent. The population is not evenly distributed: the island of Java, with only 7 percent of the country's land area, has nearly 60 percent of the nation's total population. The portion of Indonesia's population in urban areas is increasing rapidly from only 15 percent of the total population in 1970 to more than 30 percent today. By the year 2020 half of the entire population is projected to reside in urban areas.³

acronyms

AMDAL	Indonesian environmental impact assessment
BAPEDAL	Environmental Impact Management Agency
BAPEDALDA	City- or county-level BAPEDAL
BAPPENAS	State Planning Agency
BOD	Biological oxygen demand
BKPM	Investment Coordinating Board
EIA	Environmental impact assessment
GOI	Government of Indonesia
ISO	International Organization for Standardization
KADIN	Indonesian Chamber of Commerce
KLH	Ministry of Environment
MOIT	Ministry of Industry and Trade
NGO	Nongovernmental organization
PROPER	Business Performance Rating
PSL	Environmental study center
REPELITA	Government of Indonesia Five-Year Plan
US-AEP	United States-Asia Environmental Partnership
USEPA	United States Environmental Protection Agency

Economic Conditions and Trends

According to the World Bank, after a quarter century of steadily rising incomes, Indonesia has become more diversified, less dependent on oil, more industrialized, more urbanized, increasingly driven by private initiative, and more integrated into the global economy. Its policymakers are committed to deregulation, an outward orientation, and economic efficiency. Due in large part to liberalization in trade and financial sectors, Indonesia had an average economic growth of 6.3 percent between 1986 and 1992. During this period, nontariff protection measures were largely eliminated and tariffs greatly reduced.

Real growth in gross domestic product in 1994 and 1995 was 7.3 percent and 7.2 percent respectively. Today, nonoil exports make up about 70 percent of the country's total exports and the nonoil sector accounts for roughly 85 percent of the country's gross domestic product. The private sector now accounts for about 62 percent of total fixed investment.⁴ Annual per capita income currently stands at about \$900 and is projected to exceed \$1,000 by the end of the decade.⁵

2. Environmental Profile

Industrial and Environmental Development Background

The industrial sector is the driving force behind Indonesia's economic growth. Industrial goods made up 82 percent of nonoil and nongas exports in fiscal 1993-94. Manufacturing, which contributed only about 13 percent of gross domestic product in the 1970s and 23 percent in the 1980s, is expected to contribute one-third in the 1990s and nearly 45 percent in the next decade.

Four Javanese cities (Jakarta, Surabaya, Bandung, and Semarang) account for 36 percent of Java's and 27 percent of Indonesia's total output. The leading manufactured exports were textiles, garments, plywood and wood products, electrical goods, footwear, paper products, essential oils, processed foods, and edible oils. Concurrent with establishing itself as a growing exporter of basic manufactured goods, Indonesia has moved into the export of more advanced products, including aircraft and aircraft components, electronic goods, and measuring instruments. Indonesia's development strategy for the Second 25-Year Plan will rely heavily on the growth of industry to create higher productivity jobs and nonoil exports.⁶

World Bank projections indicate that the share of basic processing industries in industrial sector output will fall from 72 percent today to about 65 percent in 2010 and to 60 percent in 2020, reflecting the rapid increase in downstream processing and assembly industries, which are primarily located on Java.⁷ Since 1970 Indonesia's industrial base has grown more than eight times in size. The World Bank has projected that by 2010 new investment will account for 85 percent of total industrial capacity.⁸

Environmental Conditions

Indonesia's industrial expansion has brought with it largely uncontrolled industrial wastes and pollution leading to severe environmental degradation. The total pollution load contributed by the industrial sector has grown exponentially. World Bank estimates indicate that emissions of SO_x, NO_x, and total suspended particulates increased by factors of five between 1975 and 1988. The Environmental Impact Management Agency's (BAPEDAL's) recent emission inventories indicate that in Jakarta the industrial sector emitted approximately 15 percent total suspended particulates, 16 percent NO_x, and 63 percent SO_x; in Surabaya, industrial emissions constituted about 28 percent, 43 percent, and 88 percent respectively.

According to World Bank projections, industrial water pollution constitutes from 25 to 50 percent of the total pollution load in certain rivers in Java. Monitoring results vary widely and a preponderance of evidence indicates that urban sources account for the majority of loadings to rivers and streams on an aggregated basis; however, a 1989 survey in Surabaya estimated that industrial effluents accounted for 38 tons per day in the Brantas River, out of a total load of 120 tons per day. Monitoring in the Jabotabek area indicates that industries account for 84 tons per day of biological oxygen demand (BOD) out of a total of 171 tons per day.⁹ Much of the industrial discharges include a high level of BOD but also an increasing amount of toxic and hazardous waste. The extent to which industrial discharges are contaminating groundwater is not known; however, reports of typical industrial effluents, such as phenol, detergents, and nitrates, found in various groundwater resources in Java, seem to be increasing in number. As for hazardous wastes, a recent study estimated that about 2.2 million tons per year are currently being generated in West Java and metropolitan Jakarta.¹⁰

Environmental Trends

Indonesia currently does not have a systematic approach to compiling, analyzing, and publicizing environmental trends. BAPEDAL with funding from Japan is currently developing a strategy for state of the environment reporting. In addition, the U.S. Trade and Development Agency has recently approved funding for a feasibility study for a National Integrated Environmental Data Network in Indonesia. In lieu of an existing system for systematically measuring current conditions and identifying trends, the World Bank has relied heavily on extrapolating data from U.S. industry to project industrial pollution trends in Indonesia.¹¹

3. Government¹²

Key Ministries for Industrial and Environmental Matters

At the national level, key agencies involved in industrial environmental matters include the State Ministry for Environment, BAPEDAL, Ministry of Industry and Trade (MOIT), and the State Planning Agency (BAPPENAS). These and other agencies that play key roles in areas of importance to US-AEP are described as follows:

The *Ministry of Environment (KLH)* does not have direct implementation responsibilities but is charged with policy formulation and coordination and oversight of environmental efforts of other line agencies and ministries. The ministry's view is that it has the main role in policy formulation, whereas BAPEDAL implements pollution control programs. KLH's main focus has been on raising environmental awareness in Indonesia and putting in place a strategy for sustainable growth including laws and regulations, information systems, and a "support network" of environmental organizations. KLH has a strategy of "mainstreaming" environmental matters into GOI's line ministries, but it has not been successful. Major responsibilities of KLH include:

- *Information systems.* KLH is charged with publishing an annual report of data submitted by provincial environment bureaus; however, major differences exist in coverage, quality, and consistency among provinces. Information is incomplete but useful for "order of magnitude" policy decisions.¹³ KLH has not published a report since 1994.
- *Support network.* A part of KLH's mandate is to develop environmental skills, encourage greater awareness of environmental issues, and enhance opportunities for wider participation in the process of environmental management. The ministry has supported development of university-based environmental study centers (PSLs); in 1994 fifty-four PSLs had been established in universities in each of the twenty-seven provinces.¹⁴ The ministry, however, has recently discontinued providing direct financial support for PSLs.

BAPEDAL, under the Ministry of Environment, has responsibility for setting environmental standards, implementing compliance programs for the central government, monitoring environmental quality, and overseeing Indonesia's environmental impact assessment (EIA) process, which in Indonesia is called the

AMDAL process. Since BAPEDAL's establishment in 1990, it has seen remarkable growth from a staff of fewer than thirty to more than 300 and is the only government agency with a political appointee specifically assigned to "grow" the agency. It is chaired by the minister of KLH and has deputies for institutional development and capacity expansion, pollution control, and EIA and technical guidance. Four regional BAPEDALs are being established to administer BAPEDAL's programs in the regions. BAPEDAL has virtually no enforcement authority, although the agency is strengthening its institutional capacity for enforcement (see "Legal Mandates Program" below); a presidential decree to provide permitting/enforcement authority is being drafted by GOI.¹⁵

Ministry of Industry and Trade. The Ministry of Industry, which was recently merged with the Ministry of Trade, has historically played a lead role in administering GOI's import substitution programs, but, with economic deregulation, this role has diminished considerably in recent years. The ministry has directorates for each of Indonesia's major industry subsectors. MOIT has nine Research and Development institutes that are sector specific as well as thirteen regional research institutes. MOIT's Research and Development Center on Business Climate has an environmental unit that chairs the ministry's AMDAL commission and is examining potential policies with respect to ISO (International Organization for Standardization) 14000 and ecolabeling as well as ways to assist industry in implementing pollution prevention practices. Within the ministry, PUSTAN has the lead role for ISO 9000.

The *State Development Planning Agency* is GOI's central economic planning agency. Among its major responsibilities, BAPPENAS coordinates donor programs and projects and coordinates development of the government's five-year economic plan (REPELITA) by line ministries and monitors their progress in implementing the plan. BAPPENAS also provides input on budgetary and economic matters to the Ministry of Finance, which is the lead ministry on fiscal and economic policies.

The *Ministry of Public Works* has three directorates: roads, human settlements, and water resources. The ministry (through the Directorate of Water Resources) is responsible by law for the quality and quantity of surface water in Indonesia.¹⁶

The *Investment Coordinating Board* (known as BKPM), prior to the mid-1980s, had an extensive list of promoted industries and promotional privileges; however, with economic deregulation, the agency's scope has been substantially narrowed. BKPM still has a fairly short list of prohibited investments, including three areas of investment prohibited on environmental grounds.

The *Standardization Council of Indonesia* is the lead agency for coordinating standards policy, including accreditation and certification. The council is responsible for oversight of Indonesia's National Standardization System, which is a basis and guide for every standardization activity in the country. The council has plans to strengthen its technical capabilities this year to address new initiatives, including ISO 14000.

State Ministry for Coordination of Economic Affairs (known as ECUIN). Despite its best efforts, KLH has not been able to establish its planned Policy Analysis Unit and has to rely on external organizations to carry out policy-related studies. Government-sponsored and nonprofit research organizations engaged in this effort include the Center for Policy and Implementation Studies, sponsored by the State Ministry for Coordination of Economic Affairs.¹⁷

The *Agency for the Assessment and Application of Technology* (known as BPPT) is GOI's premier agency for technology innovation and commercialization; however, in spite of its status, the agency's environmental activities with respect to clean technology are limited, primarily focused on providing recommendations for end-of-pipe technologies to small- and medium-sized industries.

The *Central Bureau of Statistics* produces an annual report of environment-related statistics, including data on population trends, health conditions, water supply and sanitation, and other socioeconomic factors. As in the case of KLH reports, the data are not easily comparable or useful for monitoring regional or national trends.¹⁸

Other Key Institutions for Industrial and Environmental Matters

Provincial governments are responsible for environmental management at the regional level. In principle, the authority vested in the provincial government is wide ranging, including implementation of development plans, setting environmental standards, approving location permits and other licenses for new projects, and monitoring and enforcing compliance. In practice, the provinces are poorly staffed and trained to meet these responsibilities (with certain possible exceptions, such as East Java). Within the central government, the Ministry of Home Affairs is responsible for administering provincial and local government affairs. City and county-level BAPEDALs (BAPEDALDAs) will be established, pending authorization now being considered by the Ministry of Home Affairs.

No single agency at the provincial level has pollution control as its primary mandate. Rather, provincial agency mandates and staffs correspond to the central line ministries. For example, groundwater management responsibility rests with the Ministry of Mines and Energy, whereas surface water is with Public Works. Local offices of the Ministry of Public Works monitor ambient water quality, but only representatives of the Ministry of Industry have authority to enter firms to take samples; thus, the career paths of technical staffs in the provinces are not tied to BAPEDAL but rather to the line ministries.¹⁹

4. Policies and Laws

Indonesia does not have a strong framework of civil and administrative law or a supportive civil court system. Enforcement of laws depends primarily on prosecution in criminal courts under local police authorities; thus, alternatives to "traditional" enforcement systems for environmental management, such as negotiated agreements and incentives based on business and individual reputations, are currently among the central government's most important policy tools for fostering clean technology and environmental management.

Environmental Policies and Laws²⁰

Many government policies in Indonesia are put into place through a complex and sometimes contradictory array of presidential, ministerial, and gubernatorial decrees. A summary of major environmental laws and regulations relevant to industry and environmental infrastructure is provided in the endnotes.²¹ The following is a discussion of major environmental policies and programs affecting industry and urban infrastructure:

Air pollution. The Blue Sky Program was launched in July 1992 by BAPEDAL. The program includes both stationary and mobile sources. For stationary sources, the early phase program focuses on cement factories, iron and steel, pulp and paper, and coal-fired power generation. The program targets five of the largest cities: Jakarta, Bandung, Surabaya, Semarang, and Medan.²²

Water pollution. Under the Prokasih (Clean Rivers) Program, Prokasih Teams in the provinces are coordinated by the vice governor, with representatives from BKLH, the Development Planning Board (known as BAPPEDA), PSLs, research laboratories, NGOs, local officials (including local water utility managers),²³ and other relevant sectoral agencies. From 1989 to 1994, Prokasih activities have dealt with thirty-one rivers in thirteen provinces; the program now encompasses more than fifty rivers in seventeen provinces. Each provincial governor is responsible for program implementation within his or her province. Although the program is officially classified as "voluntary," in reality, the governors put great pressure on industries to "volunteer," such as by threatening to shut them down. The culmination of an agreement is a memorandum of understanding signed by each industry, the local mayor, and BAPEDAL.²⁴

Toxic and hazardous waste. Although BAPEDAL issued hazardous waste standards in late 1994, they have not been vigorously enforced. BAPEDAL has announced that such hazardous wastes should be stored on site until treatment facilities are established. One hazardous waste facility has been put into operation to serve West Java; however, the facility has only recently reached the break-even point for recovering its cost.²⁵ GOI plans to support at least two additional facilities in the near term; long-term plans call for a total of nine facilities when the level of demand would make them financially feasible.²⁶

Environmental impact assessment. Under the new AMDAL/EIA process, launched in 1993, all new and existing projects requiring permits must prepare EIAs, including environmental management plans (known as RKLs) and monitoring plans (known as RPLs). The process has also been streamlined and for many projects largely consists of the environmental management plan and monitoring plan. BAPEDAL functions as the executive agency for monitoring and evaluating the AMDAL system. Implementation authority lies with central line agencies and provincial governments, both of which are expected to establish interagency AMDAL commissions. Central agency commissions (Komisi Pusat) are chaired by the secretary general of the relevant agency; provincial commissions (Komisi Daerah) are chaired by the head of the Development Planning Board. Members include representatives from the provincial BKLH and local PSLs. Public participation is typically limited to NGOs selected to participate on the commissions.²⁷

Clean technology. BAPEDAL has developed a draft strategy for an Indonesian Cleaner Production Program. Most of the activities in the strategy involve donor assistance. Representative examples of activities include cleaner production data base and information centers, technical assistance for industry, training, demonstration projects, and policy.²⁸

Environmental audits. The Government of Indonesia has recently issued a Ministerial Decree on General Guidelines for implementing environmental audits.²⁹ Three major multinational corporations that have high-profile environmental concerns have recently conducted voluntary audits at the request of BAPEDAL: Freeport McMoRan, Indorayon, and CalTex. Findings from the Freeport audit were released to the public in April 1996 and received headline coverage in the news media.

Mandate program. The goals of this internal program of BAPEDAL, funded for two years by the World Bank, are to create momentum for environmental law, prepare and apply environmental enforcement procedures, strengthen the capacity of law officials, and increase public awareness of environmental enforcement.

Clean City Award. The Clean City Award (Adipura) is annually awarded by the president of Indonesia to the cleanest cities in the country. In 1993 fifty-eight towns and cities participated; the number was larger in 1994 and 1995. Mayors are reputed to be competing for these awards under strong encouragement from their governors, thus providing a strong incentive for action.³⁰

Industrial Policies and Laws

Industrial investment has been greatly streamlined under GOI's economic deregulation policies. Basically, foreign direct investments must be licensed by BKPM. Manufacturing equipment imported to Indonesia must be reviewed by PT Sucofindo, a government-owned corporation, to determine that it meets standards established in procurement documents.

Little evidence exists that environmental considerations have been integrated into GOI's industrial policies. The industry sector directorates within MOIT are not for the most part engaged in environmental matters with respect to their client industries. Furthermore, BKPM has recently taken a step in the opposite direction from incorporating environmental considerations into its decisionmaking by unlinking its licensing processing from the AMDAL process. The only area in which environmental considerations still have a direct bearing on BKPM's review process is on its list of prohibited investments: three of the eleven sectors that remain on the list of absolutely prohibited investments were listed for environmental reasons. In addition, Indonesian pollution control equipment can be imported duty-free.

Beyond these policies, GOI encourages new industries, both domestic and foreign owned, to locate in industrial estates by exempting facilities from the requirement to prepare environmental impact assessments (AMDAL documents) if they locate in estates that have already fulfilled the AMDAL requirement.

Public Information Policies and Laws

GOI does not have laws that mandate government agencies to provide information to the public. In fact, it is extremely difficult for the public to access government information on environmental conditions and industrial environmental performance and participate in government decisions affecting the environment. Even the AMDAL process, which provides for participation by NGOs and local representatives affected by proposed projects, typically has no provision for public review of proposed environmental assessment documents, except for participation of NGO representatives in the AMDAL committees.

A major initiative, however, to disclose information about industrial environmental performance to the general public—the Business Performance Rating (PROPER)—was launched by BAPEDAL in June 1995. PROPER is a publicly announced rating system on company environmental performance and compliance with regulations and is the first central government program in the world to publish a single index of environmental performance. The first target group of 230 factories received ratings in June 1995; names of companies rated as “black” (worst offenders) and “green” and “gold” (best companies) were released to the public in December 1995. Early results from these ratings appear to indicate that the program is having positive results. Rather than protesting their ratings, companies are coming to BAPEDAL asking what they need to do to improve them. First-round ratings were based solely on effluent quality. BAPEDAL plans to expand the coverage of the program to include industry environmental management practices and compliance with hazardous waste requirements.³¹

Protection of proprietary information was a major issue faced by GOI in drafting the guidelines for environmental audits, discussed above. Although some information has been disclosed to the public from the three major corporate audits conducted to date, the guidelines protect companies performing audits from self-incrimination.³²

Public information sharing and participation has been notable with respect to urban environmental issues. The Kampung Improvement Project has during the past twenty-five years improved services in 527 cities and towns by providing an integrated package of basic services, including water supply, sanitation, drainage, and other infrastructure. The project has included extensive participation by NGOs and the public in working with *kampung* committees to plan and monitor projects.³³

Legal and Policy Developments of Particular Relevance to Industrial and Urban Environmental Management

The original objective of Prokasih was to reduce the total effluent loadings of participating industries by 50 percent. This objective has been “ratcheted up” over time; in October 1995 BAPEDAL issued effluent standards for twenty-four industry subsectors, including concentration- and load-based standards. Inclusion of standards for toxic pollutants, although limited in scope, may begin to place more industry attention on pollution prevention rather than simply end-of-pipe solutions that have been the predominant pollution abatement strategies under the Prokasih program.³⁴

BAPEDAL’s PROPER system has attracted international attention as an important new policy approach to industrial pollution control. Environment Minister Sarwono was recently given a leadership award by the Zero Emissions Research Initiative of the U.N. University for implementing PROPER; the World Bank has given strong public support to the program.³⁵ BAPEDAL plans to expand its criteria for ranking companies, including compliance with hazardous waste regulations and environmental management practices.

5. Urban Environment and Infrastructure

The government, aided by the international donor community, has allocated increasing investment in environmental infrastructure, from \$25 billion in the 1989–93 five-year period to \$35.8 billion in the 1994–98 period. The bulk of this is for urban infrastructure, including roads, water supply, drainage and flood protection, and environmental sanitation.³⁶

For sewage and sanitation, GOI has initiated a planning exercise covering up to twenty-five cities to assess their sanitation needs. “Least-cost” technical options will need to be defined; issues of financing and cost recovery and the institutional arrangements for managing the system within each city will need to be resolved.³⁷

Indonesia’s progress in meeting its pressing urban environmental infrastructure needs is summarized as follows:³⁸

Water Supply

Only 34 percent of Indonesia’s urban poor have household connections to piped water. Water supply is plagued by high volumes of unaccounted-for water, inefficient metering, and insufficient pricing.

Wastewater

Wastewater management has traditionally been viewed as a personal, not governmental, responsibility; hence, Indonesia has one of the worst service coverage percentages for sewers in the world. In 1994 the government reported that 2.4 percent of the urban population was served or was scheduled to be served by sewerage systems.

Solid Waste

Collection and disposal of solid waste is an increasing challenge in most large cities. An estimated 15–20 percent of urban solid waste is not collected at all; much of what is collected ends up in uncontrolled dumps; however, the outlook for the future is promising. Collecting fees is not difficult; tariff rates in major cities are high enough to support profitable enterprises. The director general of Cipta Karya is committed to privatization.

Hazardous Waste

GOI has supported three projects for central treatment, storage, and disposal facilities: Jakarta (currently operating, but only at 30 percent capacity), Surabaya (in progress), and Kalimantan (project development stage).

6. Private Sector and Academia

Industry

Given the export orientation of Indonesian industry, it is perhaps surprising that the industry has shown a general lack of appreciation for ISO 14000. A number of industry associations and chambers of commerce, however, have recently shown an active interest in developing ISO 14000; attendance at seminars and workshops has been brisk.³⁹

In addition to clean production programs set up by a number of government agencies, private sector support is illustrated by the fact that KADIN (the Indonesian Chamber of Commerce) has agreed to be the site of the United Nations Industrial Development Organisation's proposed National Cleaner Production Center, although the actual establishment of the center is still uncertain. In addition, the American Chamber of Commerce has a strong environment committee.

Indonesia has an emerging domestic environmental industry, both in equipment manufacturing and environmental engineering and consulting. A new environmental industry trade group has been formed, the Indonesian Environmental Trade Association. Another important group that provides a forum for environmental professionals in the private sector as well as government is the Indonesian Association of Environmental and Sanitary Engineers.⁴⁰

About 150 companies have been certified for ISO 9000. GOI has placed no direct pressure or provided incentives for firms to be ISO 9000 certified; at present no discussion has occurred on placing direct pressure or incorporating standards into regulations. Nevertheless, ISO 9000 has picked up momentum, as evidenced by the fact that firms have recently placed ads in newspapers announcing that they have been certified.⁴¹

A number of industry associations, chambers of commerce, and so on have shown active interest in the development of ISO 14000; attendance at seminars and workshops has been brisk. Under the coordination of the Standardization Council of Indonesia, six working groups have been formed to shape the best certification procedure for Indonesia, consisting of government (BAPEDAL and MOIT), NGO, university, and industry (INKINDO) representatives.⁴²

Academic and Research Institutions

Several joint clean technology research programs exist between industry and university/research institutions, for example, between KADIN and Gajamada University and between industry and government programs, largely through MOIT's research and development institutes. MOIT's institutes are under a mandate to become self-supporting and have begun to privatize their consulting activities to industry with mixed success (ranging from 20 percent to as high as 70 percent self-sufficiency).

PSLs were originally established with the strong support of the central government to provide environmental centers of excellence around the country; however, the PSLs around the country are currently primarily engaged in EIA activities and do not appear to be focusing on clean technology/environmental management issues to any major extent. Furthermore, recent regulations issued by GOI have made host universities responsible for PSL funding. This has resulted in a major retrenchment of PSLs in both the scope of their activities and their capabilities.⁴³

Financial and Insurance Institutions

As a result of deregulatory measures in the banking sector in the 1980s, the number of private commercial banks has grown to 144 with 2,773 offices. In addition, the state owns five banks with 981 offices, each serving specific sectors of the economy. Both state and commercial banks generally require submission of an EIA (AMDAL document) prior to loan approval; however, the level of scrutiny varies widely across institutions depending on their priorities and capacity. For example, Bank Indonesia, the country's central bank, does not have an explicit policy concerning the EIA review process. Other banks review the document to varying levels of detail; at least one private bank requires the loan package specifically to include financing for pollution controls if called for in the EIA.⁴⁴

7. Environmental Awareness and Public Involvement

General Public Awareness of Environmental Issues

Coverage of environmental issues has increased tremendously in recent years; news stories in the press are commonplace. One NGO that prepares press clippings from all of the provinces reported to the US-AEP assessment team that they find hundreds of environmental articles each week. Other anecdotal evidence abounds, for example, a newspaper targeted to Jakarta's young people (AIKON) is committed to raising environmental awareness; the Indonesian Forum for the Environment (see below) has sponsored a number of workshops for journalists.⁴⁵

Although the Ministry of Environment has stated that it intends to produce annual state of the environment reports, the reports are actually published irregularly and do not appear to be widely recognized by the environmental community. On the other hand, in metropolitan Jakarta a number of continuous air quality monitors, funded by Japan, display air quality information to the public on a real-time basis.

Nongovernmental Organizations

Nearly 270 NGOs in Indonesia are engaged in environmental matters. Some of the largest NGOs include the following⁴⁶:

The *Indonesian Forum for the Environment* is an umbrella organization for hundreds of grassroots environmental NGOs throughout Indonesia. Founded in 1980, the forum has been actively engaged in industrial environmental issues, including conducting tests of water quality and industrial effluents, litigating against industries, as well as participating in positive industry/NGO dialogue forums. Regarding the latter, the forum was engaged in dialogue with the pulp and paper industry and MOIT, which resulted in Indonesia's move away from chlorine processes.

Indonesian Legal Aid Foundation (known as LB). With chapters in fourteen cities, the foundation is a group of human rights and environmental lawyers providing legal representation to communities throughout Indonesia. In June 1995 foundation lawyers persuaded judges to accept as evidence reports that the foundation obtained from government agencies showing severe deterioration of the Surabaya River just downstream from three paper mills. Lawyers with the Indonesian Center for Environmental Law (see

below) and LB Jakarta are bringing a lawsuit against four paper mills on the Ciujung River in Serang, West Java. The case is pioneering the use of “class action” legal standing.

E-Law Indonesia was established by the Indonesian Forum for the Environment and the Indonesian Legal Aid Foundation in 1991. More than forty environmental advocates from throughout Indonesia came together at a conference in Palembang in the summer of 1995 to share ideas and information about the pulp and paper industry, cited in an E-Law report as “one common enemy of most all Indonesian environmental advocates.”

The *Indonesian Center for Environmental Law* provides public policy input to the Indonesian government at the central and regional levels and gives legal assistance to community advocacy groups. The center is preparing itself to be the most complete data, information, and documentation center for environmental law in Indonesia.

Friends of the Environment Fund (known as DML) is a business NGO, with about 150 corporate members. The organization promotes recycling, including by funding a plastics recycling program in Jakarta, and publishes a periodical on addressing industrial environmental issues. Among its programs, the fund provides small grants to environmental NGOs.

The *Institute for Eco-Labeling* has recently been established by a former minister of environment.

8. U.S. Government Activities

U.S. Agency for International Development

Under the U.S. Agency for International Development mission’s Indonesia Clean Industrial Production program, waste reduction assessments have been conducted in six industry subsectors (pulp and paper, metal finishing, flex packaging, wet batteries, paints, and furniture coatings). Under the Association of Southeast Asian Nations’s Environmental Improvement Project, waste audits have been conducted in other sectors, including iron and steel, and food processing.⁴⁷

Under the mission’s Municipal Finance Project, started in 1989, the mission has provided extensive assistance to GOI in decentralizing urban infrastructure financing. The project is developing municipal financing mechanisms such as bonds and the Regional Development Account. The Private Participation in Urban Services project is the mission’s principal vehicle for delivery of technical assistance in developing partnerships and private sector participation in urban infrastructure development, including assistance in addressing legal policy reforms needed for successful privatization activities.

U.S. Environmental Protection Agency (USEPA)

USEPA, in addition to its activities in Indonesia as a US-AEP partner, is currently providing or considering assistance to Indonesia in several areas⁴⁸:

- In conjunction with the U.S. Agency for International Development's Rapid Assessment Program and by leveraging significant funding from the World Bank, USEPA has begun an extensive review of Indonesia's pesticide regulatory program. The second phase of the program will include expanding the lessons learned from this project to other interested Southeast Asian countries.
- USEPA is considering an Indonesian request to place select USEPA officials in priority regional BAPEDALs to support their development.

US-AEP Activities in Indonesia

US-AEP has supported 226 environmental exchanges, processed 300 trade leads, and sponsored 55 technology grants through the National Association of State Development Agencies, in addition to initiatives through the Council of State Governments. With USEPA, US-AEP has supported short-term technical assistance and training modules.

9. International Organizations and Bilateral Assistance

GOI is receiving an extensive array of multilateral and bilateral assistance in clean technology and environmental infrastructure. Five bilateral and three multilateral projects involve cleaner industrial production. BAPEDAL is a major recipient of capacity-building assistance. Representative donor activities include the following⁴⁹:

World Bank

BAPEDAL Development and Technical Assistance Project. The project is providing extensive assistance to BAPEDAL through five projects designed to build capacity for standards setting, monitoring, enforcement, permitting, and laboratory capacity.

Industrial Technology Development Project is directed toward Agency for the Assessment and Application of Technology, MOIT, and the Indonesian Institute of Science. It is intended to (a) strengthen Indonesia's system of industrial metrology, standards, testing, and quality support services, (b) finance provision of technology-upgrading services to small- and medium-sized enterprises by both public and private technology suppliers, (c) provide assistance for reorienting the public research and development labs to support technology development in the private sector, especially small- and medium-sized enterprises, and (d) strengthen the capacity to formulate and coordinate technology and industrial strategies, policies, and programs.⁵⁰

Indonesian environment and development. The World Bank in 1994 completed a comprehensive study of environment and development in Indonesia. The study included an analysis of industrial pollution intensity that the Bank is still refining.⁵¹

Metropolitan Environmental Improvement Project, Jakarta. This project has provided a wide range of technical, financial, and institutional assistance to Jakarta in managing its environmental problems.

Asian Development Bank

The Asian Development Bank's BAPEDAL Regional Network Project will provide loans and technical assistance to BAPEDAL for institution building, establishment of regional BAPEDALDAs, and interagency coordination. The project has made slow progress because much of the groundwork and the establishment of BAPEDALDAs is being done under the World Bank assistance project, which has yet to complete the groundwork. The Asian Development Bank's operational program for environmental infrastructure is summarized in the endnotes.⁵²

United Nations

BAPEDAL Integrated Marketing Communications Strategy under the U.N. Environment Programme provides assistance to BAPEDAL to improve its social marketing strategy as part of its larger objectives to improve public awareness, attitude, and behavior with respect to environmental protection.

The United Nations Industrial Development Organisation has chosen KADIN as the location for a National Cleaner Production Center; however, the actual establishment of the center is still uncertain.

Bilateral Assistance

Australia has initiated a five-year project of technical assistance, technology demonstration, and training support in clean production in East Java.

Canada is currently designing a project to provide environmental management assistance to the provinces.

Germany is providing technical assistance to BAPEDAL, focusing on the textile industry in a watershed close to Bandung.

Japan has provided \$125 million for a soft loan program to finance pollution control equipment and consulting services for pollution prevention. About fifty-five loans have been made under the first phase of the program, primarily for pollution control equipment. Japan and GOI are currently negotiating the second phase of the program, which will be about \$225 million. Japan has also established a pilot wastewater treatment plant and provides operator training at the Bandung Institute. In addition, Japan is providing assistance to BAPEDAL to strengthen the agency's ambient environmental quality monitoring program, including building laboratory capabilities.

The Netherlands is providing technical assistance to BAPEDAL in strengthening its monitoring capacity.

10. Opportunities to Support Clean Production and Environmental Management

Policy Framework

PROPER program. BAPEDAL is planning to expand the PROPER program from dealing solely with effluent quality to more general facility environmental management and compliance with hazardous waste requirements. Because an effective disclosure system may be applicable throughout the region (e.g., the

Philippines government has expressed interest in the PROPER system), donor support in improving and expanding the rating system may pay major dividends, both in terms of improving Indonesia's system and in fostering the concept throughout the region.

AMDAL process and commissions. The AMDAL process is similar to the EIA process in the United States, which forces project sponsors to consider and mitigate the environmental and social consequences of major development projects. In Indonesia, a firm's ability to obtain investment licenses, commercial loans, and operating licenses is tied to the AMDAL process. If a simple and effective but quick AMDAL process could be devised that required consideration of technology choice on the environment for new investment, it could provide a major opportunity for improving environmental management.

The "public participation" component of the AMDAL process is currently limited to participation of selected NGOs to sit on the national or provincial commissions. A more broadly based institutional mechanism providing for input to the process from a larger segment of the public (e.g., public hearings and publication of proposed recommendations for public comment) would greatly foster engagement of the public in the decisionmaking process.

Economic development. Indonesia is preparing its next five-year economic plan (REPELITTA VII). Because preparations of REPELITTAs rely on an extensive consensus-building process across the government, this planning process may provide a unique opportunity for GOI to articulate a plan for integrating environmental considerations into industrial and economic development policies. Long- and short-term donor assistance to BAPPENAS could be invaluable in mobilizing support for an integrated industry and environment program.

Level the playing field for cleaner production/pollution prevention. A systematic bias exists in Indonesia's environmental policies, favoring end-of-pipe solutions. This bias reflects a significant lack of information about clean production and may be depriving firms of more cost-effective options. A policy program to level the playing field would involve redressing the bias in environmental management and overcoming a market failure in technology information markets.

Industrial Environmental Management

ISO 14000. The ISO 14000 movement could be a useful focus for donor activities to galvanize support of the central industrial and economic planning ministries for environmental and quality improvement. At the present time, most of the industry sector directorates within MOIT are not aggressively engaged in clean technology and only beginning to appreciate ISO 14000 and its implications for competitiveness. With deregulation of the economy, however, the ministry is sorting out new priorities and directions and may well be open to assuming a leadership role in aggressively promoting and moving ISO 14000 forward in Indonesia. An ISO 14000 program might include (a) information seminars for senior government officials, (b) high-level visits to one or more of the first- and second-tier newly industrialized countries to explore their approaches to ISO 14000, (c) assistance to GOI in searching for the best "home" for ISO 14000, and (d) a business awareness program and cost-effective certification program for small- and medium-sized firms.

Within MOIT, ISO 9000 and 14000 are managed by different organizations without a closely coordinated effort. Advice on how these two processes may be more closely integrated would be welcomed by PUSTAN.

Role for MOIT in PROPER program. A real need exists to provide systematic assistance that could help firms receiving poor ratings under BAPEDAL's PROPER Prokasih program to upgrade their environmental practices and business rating. Perhaps MOIT could become the primary repository of advice for firms with poor ratings seeking to improve their ratings. This could be an effective way of enticing MOIT to begin mainstreaming the environment into its programs.

National Pollution Prevention Roundtable. Indonesia has recently established a pollution prevention organization in conjunction with the National Pollution Prevention Roundtable in the United States. This new organization could provide an important forum for transferring U.S. clean production experience, technology, and practices.

Environmental Infrastructure

Revolving fund. East Java may be the first province to initiate an environmental permit system, which could include an effluent charge scheme and a revolving fund for environmental infrastructure. This program could provide a "model" permit/charge scheme that could be emulated in other provinces and possibly throughout the region.

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1. World Bank (1992).
2. World Bank (1994, 4–5).
3. World Bank (1994, 10–11).
4. World Bank (1994, 8–9).
5. Michael Rock, Winrock International, Arlington, Virginia (August 1996).
- 6.. World Bank (1994, 23).
7. World Bank (1994, 16–17).
8. Brandon and Ramankutty (1993, 8).
9. World Bank (1994, 76). Data are seriously lacking on industrial effluents and water quality; wide discrepancies have been observed in estimates of the degree to which industrial sources contribute to Indonesia's water quality problems compared with the contribution of municipal and other sources. Original source materials providing estimates of BOD5 (the amount of dissolved oxygen needed or consumed in five days by biological processes to break down organic matter in effluent) loadings to rivers show that 15–30 percent can be attributed to industrial sources, compared to 25–50 percent cited in this source. In 1996 BAPEDAL reported that 80 percent of BOD5 was from household sources (Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta [September 20, 1996]).
10. Tumiwa (1995, 9–10).
11. The World Bank has conducted an extensive analysis of industrial pollution in Indonesia, using its Industrial Pollution Projection System. The system uses data from facilities in the United States, derived from the U.S. Environmental Protection Agency and U.S. Census Bureau data bases (World Bank 1994, 74–83).
12. Unless otherwise noted, much of the information in this section was collected during a visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996).
13. World Bank (1994, 181).
14. World Bank (1994).
15. Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta (September 20, 1996).
16. Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta (September 20, 1996).
17. World Bank (1994).
18. World Bank (1994, 174–75).
19. World Bank (1994, 179–87); information collected during a visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996).

20. Unless otherwise noted, information in this section was collected during a visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996).

21. Major laws and regulations affecting industrial and environmental infrastructure are as follows (much of this information was drawn from Louis Berger International [1994]):

- *Law No. 4 of 1982 (Environmental Management Act)*

Provides for:

1. The right of every person to a good and healthy living environment
2. “Polluter pays” principle
3. EIA requirements (existing and new facilities)
4. Authority to establish licensing systems
5. Right of every person to participate in environmental management process
6. Compensation of victims of environmental damage.

- *EIA (AMDAL process)*

EIAs are administered by implementing ministries. Each ministry has review committees.

Regulation No. 29 of 1986: Implementation of EIA as authorized under Law No. 4.

Regulation No. 51 of 1993, which replaced Regulation No. 29, eliminates some of the confusion arising from procedures in Regulation No. 29, including:

1. Shortening the time requirement for the AMDAL process
2. Improving the evaluation process, especially for multisectoral activities
3. Increasing compliance by linking the issuance of permits to the AMDAL process (World Bank 1994, 36–37).

- *Water Pollution Control*

Act No. 11 of 1974 gives the governor of each province the authority to:

1. Establish intended uses of waterways and pollution carrying capacity
2. Establish liquid waste quality standards and issue permits for liquid waste disposal
3. Enter and inspect pollution sources.

EMA and Act No. 5 of 1984 are the bases for implementing water pollution control in industry.

Regulation No. 20 of 1990 on Water Pollution Control governs the control of water pollution in general by licensing instruments, water quality, and waste quality standard determination.

- *Land Use Planning and Siting*

Act No. 24 of 1992 (Spatial Planning Act): In recognition of the need for better planning and coordination of urban sector investments, GOI in 1992 passed a new law on “spatial planning.” The law provides for identification of environmentally sensitive areas, where development activities would be restricted, and improved planning for the location and

support of significant “activity centers.” The preparation of “Strategic Structural Plans” provides an opportunity for municipal governments to protect critical ecosystems and guide the development of urban sector growth, with a least-cost provision of supportive infrastructure. Implementing regulations had not yet been put in place as of July 1994 (World Bank 1994, 139)

- *Air Pollution Control*

No specific regulations on air pollution have been promulgated; however, regulations under other programs address air emissions (e.g., emission standards for hazardous waste incinerators, odor restrictions, and provincial air quality standards).

- *Hazardous Substances and Waste*

The Hazardous Substances Ordinance 1949 regulates the import and use of nonwaste hazardous substances.

The Ministry of Industry Decision Number 148/M/Sk/1985 on the security of Hazardous and Toxic Substances in Industrial Companies states that it is the duty of industry to take steps to prevent pollution by hazardous and toxic substances:

1. In the planning and establishment phase, covering the choice of site, processing technology, design, and equipment
2. In the operation phase, covering storage, processing, and transporting of hazardous substances.

Government Regulation 19 of 1994 on Hazardous Waste Management deals with regulation of hazardous and toxic waste, based on the cradle-to-grave approach. Handlers of hazardous and toxic substances should have responsibility for “coping with environmental disaster and pollution,” but the regulation does not apply strict liability principles. An EIA is required for hazardous and toxic waste treatment activities.

22. World Bank (1994, 6).
23. Local water utility agencies (known as PDAMs) have been particularly influential in a number of the Prokasih committees, because they are directly and adversely affected by high pollution levels in surface waters (Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta [September 20, 1996]).
24. World Bank (1994).
25. Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta (September 20, 1996).
26. US-AEP (1996); World Bank (1994, 134).
27. World Bank (1994, 184–85).
28. Bratasida and Lowry (1995); Tumiwa (1995, 25–28).
29. Louis Berger International (1994); Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta (September 20, 1996).

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30. Butler, Marcotte, and Rock (1996). The Adipura award has been an extremely successful alternative to command and control policies in Indonesia; many argue it is the most successful. The incentive for mayors is extremely effective: their reappointment is often contingent on their cities receiving the awards. In the past, awards were primarily based on the cosmetic appearance of cities; however, in 1996 many other factors were heavily weighted; as a result, some cities that had won the award for six years in a row failed to win again (Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta [September 20, 1996]).
 31. World Bank (1994, 5); information collected during visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996); Afsah, Laplante, and Makarim (1995, 19).
 32. Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta (September 20, 1996).
 33. World Bank (1994, 194–95).
 34. BAPEDAL (1995) provides the effluent standards issued in October 1995. It is noteworthy that the standards generally address “conventional” pollutants (BOD5, TSS, and so on); for some industries, they also include standards for toxic metals.
 35. World Bank (1996).
 36. World Bank (1994, 22).
 37. World Bank (1994, 122).
 38. US-AEP (1996).
 39. World Bank (1994).
 40. US-AEP (1995); Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta (September 20, 1996).
 41. World Bank (1994, 2–3); information collected during visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996).
 42. World Bank (1994, 2–3); information collected during visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996).
 43. Information collected during visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996); Mary Boomgard, US-AEP environmental infrastructure representative, Jakarta (September 20, 1996).
 44. Information collected during visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996).
 45. Information collected during visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996).

Endnotes

46. Information in this section was collected during visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996); Indonesian Forum for the Environment (1996); Indonesia Center for Environment Law (1996); Environmental Law Alliance Worldwide (1996).
47. Information collected during visit to Jakarta, Indonesia, by John Butler, US-AEP/IRG; Elizabeth Marcotte, EP3; and Michael Rock, Winrock International (April 29–May 10, 1996).
48. Marianne Bailey, Asia Program Manager, Office of International Activities, U.S. Environmental Protection Agency (August 22, 1996).
49. Information from this section is from Tumiwa (1995) unless otherwise noted.
50. World Bank (1995b).
51. World Bank (1994).
52. The Asian Development Bank's Operational 1995-97 Program for Environmental Infrastructure includes (Asian Development Bank [N.d.]):
 - *1995 firm loans*
 - Capacity Building Project in the Water Resources Sector (\$27.5 million)
 - Sumatra Urban Development Sector (\$120.0 million). Project will include urban roads, drainage, water supply, sanitation, solid waste management, and *kampung* and market infrastructure improvement.
 - West Java Urban Development Sector (\$70.0 million). Description same as that for Sumatra
 - *1996 loan pipeline*
 - Industrial Pollution Control (Cimahi): \$40.0 million
 - *1995 Technical Assistance Program*
 - National Environmental Sanitation Plans and Programs: \$600.0 million

country
assessment:
KOREA

Prepared by:

US-AEP



UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



10A

Korea

By Malcolm Forbes Baldwin

A country the size of Indiana with a population of 41 million, South Korea* has achieved an annual per capita income of about \$11,000.** In contrast, North Korea has a population of 23 million and annual per capita income of \$1,000. The contrast grows sharper as South Korea's rapid industrial and urban growth becomes ever more integrated as public and community environmental concern rises, the government continues to increase the rigor of enforcement actions and incentives for clean technology and infrastructure investment, and the business community recognizes market demands for better environmental management.

1. Economic Profile

Demographic Conditions and Trends

Korea's population grew rapidly after World War II, from 15 million in August 1945 to 21 million in 1948 and nearly 43 million in 1989. But the 3 percent annual growth up to 1960 dropped to less than 1 percent after 1989.¹ Korea's population is expected to rise to 47 million by the year 2000, of which 51 percent will live in the six largest cities.

Economic Conditions and Trends

Korea's gross national product per capita grew from \$67 in 1953 to \$100 in 1977, \$2,000 in 1983, \$5,000 in 1989, and about \$11,000 today. The United States achieved that level in 1978, Japan in 1984, and Taiwan in 1992.² Exports in 1995 increased during 1994 by 24 percent. Not surprisingly, Korea is rated the "second most aggressive" country in business after Japan.³

Economic growth of 7–8 percent has been experienced during most of the 1990s; reduced growth is anticipated in the late 1990s and 5–6 percent during the first decade of the next century. An increase in annual per capita income to nearly \$20,000 is possible by 2001. Reunification with North Korea is a continuing political and economic question that, should it occur, will create needs for South Korea to devote vast new resources to finance reconstruction, including environmental cleanup, in the north.⁴

2. Environmental Profile

Industrial and Environmental Development Background

Korea's rapid industrial development during the past thirty years has been astounding by any standard. Export-oriented economic policies and investment in heavy industries in the late 1960s and 1970s and policies that fostered the growth of Korean companies into large multinational corporations have made South Korea a major economic power in Asia. Its level of prosperity contrasts starkly with North Korea. Today, South Korea looks toward full partnership with the advanced industrial countries of the world.

* In this assessment, Korea refers to South Korea or the Republic of Korea.

** Unless otherwise indicated, all dollar amounts are U.S. dollars.

acronyms

EIA	Environmental impact assessment
ISO	International Organization for Standardization
MOE	Ministry of Environment
MOST	Ministry of Science and Technology
MOTIE	Ministry of Trade, Industry, and Energy
NGO	Nongovernmental organization
NIER	National Institute for Environmental Research
US-AEP	United States-Asia Environmental Partnership
USAID	United States Agency for International Development

Korea's growth has come at now well-recognized environmental costs, because environmental policy was not integrated into its industrial policies at the beginning of its development push. Korea's first environmental law, on public nuisance, came in 1963, followed by additional legislation in the 1970s; but only in the 1980s did Korea begin integrating environment into its pursuit of high growth/high export industrialization. The Korea Constitution was amended in 1987 to provide for the right to a clean environment.⁵ Integration of environmental and industrial policy accelerated in the 1990s. The Environmental Administration (established in 1980 under the Ministry of Health and Social Affairs) became the Ministry of the Environment in 1990, under the Basic Environmental Act. A phenol spill in the Nakdong River in 1991 and the United Nations Conference on Environment and Development in 1992 focused national attention on the need to bring environment to the forefront of Korea's economic priorities. Since then, other major ministries have increasingly incorporated environment into their structures, budgets, and policies, particularly the Ministry of Finance and Economics and Ministry of Trade, Industry, and Energy. An Environmental Preservation Committee, chaired by the prime minister, is charged with environmental planning and policy coordination with twenty-three representatives from key ministries.⁶

Environmental Conditions

The push for economic growth has resulted in health-endangering air in cities and industrial areas, badly polluted streams and rivers, and soil pollution from acid rain, chemicals, and chemical fertilizers.⁷ Addressing these problems requires attention to a number of environmental conditions illustrated by the following facts:

- Koreans consume more water per capita than most West Europeans.
- Koreans generate more solid waste per capita than citizens of any other country.
- Industrial and urban growth is rapidly changing Korean land use patterns.⁸

Central and other local/municipal government expenditures for environmental conservation have stayed at about 1 percent of (rising) gross domestic product (excluding nature conservation and potable water supply investment) during the 1990s. Although all pollution-related expenditures are up, the proportion for air quality, water quality, and wastes is increasing.⁹ The potential of the Korean market for environmental goods and services has been conservatively estimated at more than \$4 billion annually or about 1.3 percent of Korea's gross national product.¹⁰

Environmental Trends and Issues

Among the key environmental trends and ongoing/planned responses during the next ten years are the following:

- Reductions in SO₂ concentrations have improved in Seoul in recent years, but the number of cars in Korea, expected to increase from 7 million today to 13 million by 2000, has required stepped-up measures to reduce vehicle and industrial pollution through fuel substitution and low-emission diesel and electric vehicles.¹¹
- Efforts to reduce per capita water use are focusing on a variety of measures to improve water use efficiency.¹²
- Ongoing new investment in sewage treatment aims to increase the ratio of treated to untreated water from the current 42 percent treatment ratio to a ten-year goal of 80 percent during the next ten years.¹³
- Ongoing actions seek to reduce per capita solid waste generation (from 1.5 kilograms per day to a ten-year goal of 1 kilogram per day); public expenditures are seeking vast increases in incineration, reduced landfill, and greater recycling (from a ratio of 2:86:12 to one of 50:25:25).¹⁴
- Programs are reducing national industrial air pollution (e.g., SO₂), but increased regional pollution problems include air and water pollution from North Korea, acid rain from China, and pollution of the Yellow Sea.¹⁵
- Soil contamination and cleanup are receiving increasing attention following passage of the Soil Protection Act of 1996, which will focus on developing ways to clean up the 140 abandoned mines, 100 landfills, and 60 military storage areas in Korea.¹⁶

3. Government

Government has responded recently to environmental issues with evident and fast-moving integration of environmental and industrial policies, marked by cooperation and some competition between government ministries.

* In January 1997, 1 Korean won equaled approximately US\$.0012.

Key Ministries

Some fourteen central government ministries and administrations engage in environmental management. Those most concerned with industrial/urban affairs include the following:

The *Ministry of Environment* (MOE) has primary responsibility for environmental policies and policy implementation under the present Government Organization Act. The main duties of MOE are establishing environmental and emission standards, managing environmental facilities, overseeing treatment of toxic chemicals, conducting environmental impact assessments (EIAs), preserving natural conservation areas, and developing environment-related science and technology, including resolving environmental disputes and developing environmental pollution prevention technology.¹⁷ MOE directs its four regional offices and local government environmental departments, including inspection priorities and management of enforcement programs.¹⁸ MOE's headquarters and regional staff grew from 238 in 1980 to 1,100 in 1994; between 1984 and 1992, its budget grew from 343 hundred million won* to 2,697 hundred million won.¹⁹

The *Ministry of Trade, Industry, and Energy* (MOTIE) has important environmental responsibilities, a larger budget, a larger staff, and more political influence than MOE. MOTIE's primary concern is industrial growth; it remains an advocate of industrial deregulation, while increasingly recognizing the importance of environmental issues.²⁰

The *Ministry of Finance and Economics* includes functions of the U.S. Treasury Department and Office of Management and Budget. It includes the Economic Planning Board, which exerts influence through policy coordination and a budget control process. It recently established a special interministerial Committee on Global Environmental Policy.²¹

Other important ministries include the following: the *Ministry of Construction and Transportation* is responsible for master plans throughout the country, management of freshwater resources, and construction of wastewater treatment plants²²; the *Ministry of Science and Technology* (MOST) is responsible for research and development of all applied technology and oversees the Korea Institute of Science and Technology and the Korea Advanced Institute for Science and Technology (see below); and the *Ministry of Labor* formulates measures to prevent occupational diseases and improvement of working conditions.

Other Key Environmental Institutions

MOE, MOTIE, and MOST draw support from an enormous network of associated nonprofit public corporations. Among those of importance to the U.S.-Asia Environmental Partnership (US-AEP)²³ are the following:

- *National Institute for Environmental Research* (NIER). NIER does monitoring work and research related to regulations for MOE. Its major emphasis is water quality, with four labs established since 1978 on the Han, Keum, Naktong, and Yeong San rivers. In the future, NIER will be in charge of monitoring ambient water quality for Korea, employing people from MOE. A division within NIER reviews EIAs, which it and MOE are trying to improve.

NIER's largest activity is the Highly Advanced National (G7) Project, designed to bring Korea's environmental technology to a level equal with that of advanced countries.²⁴ It is concerned about increasing acid rain problems from China about which more information is needed.²⁵

- *Korea Resource Recovery and Reutilization Corporation*. As strengthened in 1993 under an act of the same name, the corporation is responsible for collecting and sorting waste plastics, paper, scrap iron, and agricultural pesticide containers, as well as administration of the waste management fund and enforcement of recycling laws. Collection responsibilities are shared with local government, but the corporation's authority is expected to be strengthened.
- The *Korea Institute of Science and Technology*, first established by the U.S. Agency for International Development (USAID), is the only hardware-oriented research institute in Korea, doing more applied than basic research. Thirty to 40 percent of its work is industrial/environmental research, such as developing hardware for septic tanks, under contract to the private sector. Sixty to 70 percent comes from government under the Highly Advanced National (G7) Project, including funds received by proposals to NIER concerning water treatment and reuse, long-range airshed movement, and acid rain research. The institute has 1,300 people focused on (a) new materials, (b) environmental and welfare technology, and (c) basic research.
- The *Korean Environmental Technology Research Institute* was established in 1993 after the discharge of phenol by industry into the Naktung River—a major pollution incident that mobilized attention to Korea's industrial pollution problem, stimulating a major shift in environmental priorities. The institute is MOE's major think tank on environmental issues. A long-term plan for 2020 is under way by the Ministry of Finance and Economics, involving all sixteen research institutes; the institute, under MOE, is the environmental policy leader.²⁶
- The *Korea Institute for Economic Policy* began in 1989 as an Asia-Pacific Economic Cooperation study center to help the Economic Planning Board (now under the Ministry of Finance and Economics) to build trade and environmental coordination and to implement trade agreements and international conventions, such as the Montreal Protocol. The institute published a report that cites US-AEP as one of the most effective elements of the U.S.-Korean relationship by its promotion of the use of trade for environmental improvement.
- The *Korea Academy of Industrial Technology* is a government laboratory established by MOTIE to help small industry (companies with fewer than 200 staff and less than \$10–12 million in revenue) to be competitive and environmentally sound. The academy requires that a small industry be involved in each project, providing 10 percent of the funding. The academy will work with large companies also if they contribute at least 50 percent of the funds. The academy's Clean Technology Center, headed by a former Batelle Institute engineer, has a budget of \$8 million from MOTIE, receives an additional 40 percent from private companies, and is expected to have a budget of \$30 million in 1997 and a staff of sixty.

Environmental Policy

Korean policy largely centers around important multiyear programs that target certain outcomes during a specified period. Environmental issues can be a component of broader programs; more detailed five-year plans can focus on such specific initiatives as waste management. Among the key planning initiatives are the following:

The *Five-Year Plan for the New Economy, 1993–97* includes mid- and long-range plans for environmental improvement.²⁷ It focuses on five areas: (a) maximizing environmental protection in developing energy and other resources, (b) developing the environmental technology industry, (c) encouraging expansion of environment-related infrastructure and private investment in environmental projects, (d) increasing government investment in environmental protection and creating a special account to that end, (e) streamlining and enforcing environment-related regulations more stringently.

Ten-Year Environmental Science and Technology Development Plan. Launched in 1992 by MOE in cooperation with MOTIE, MOST, and the Ministry of Construction, it seeks to solve Korea's environmental problems and to establish an exportable Korean environmental industry. Three goals and phases are to obtain and develop basic technology (1992–94), apply the technology to manufacturing and industrial processes (1995–97), and manufacture and export the environmental technology (1998–2001).

MOE has also established a long-range master plan, *Korea's Green Vision 21*, designed to foster a sound national environment and codify sectoral environment standards to be attained by the year 2005.²⁸

Policy implementation and management of programs of MOE have, in significant respects, been delegated to regional offices and local governments. Issues of intergovernmental coordination, local government expertise, and monitoring of environmental policy and program results were not assessed by the US-AEP team, although they are of critical importance.²⁹

4. Policies and Laws

Korea's environmental and industrial policies and laws are affected by several competing but potentially complementary trends. These include rising public environmental concern that is accepted and acknowledged by government and industry, recognition of environment as a factor in global trade, concern about overregulation, and widespread interest in regulatory reform.

Environmental Policies and Laws

The Korea constitution provides for the right to a clean environment.³⁰ Since 1990 Korea has enacted a series of laws on air, coastal, marine, and inland water pollution; solid wastes; toxic chemicals; EIAs; and noise.³¹ Opportunities for citizen engagement are increasing, as evidenced by the EIA law, which permits public review and comment.

Environmental enforcement. Although enforcement actions are not widely believed to be significant causes of environmental improvement by large industries and small industries are still considered to be highly polluting, government enforcement has steadily improved.³² In response to evident and rising public concern, the government has engaged citizens in reporting pollution through faxes, the Internet, and telephone links with the government.³³

Environmental dispute resolution. Laws are guides to government action, not opportunities for litigation to force government compliance. Few tort liability cases occur. Dispute resolution issues and concepts are important because people cannot get easy access to the courts; procedures are expensive and time consuming. In 1990 Korea followed the model of the Japanese by establishing an administrative coordinating committee on environmental pollution to handle damages and give awards quickly.³⁴

Industrial policies and laws. Various laws authorize charges for ten specified air pollution emissions and water pollution discharges designed to cover treatment and environmental costs. Charges are deposited into the Environmental Pollution Prevention Fund, which is managed by the Environmental Management Corporation. Local government receives a percentage for collection expenses; the remainder goes toward construction/operation of industrial wastewater treatment facilities, other pollution prevention projects of the government, or soft loans to industries for installation of treatment systems.³⁵

Industrial Policies and Laws

Similarly, the government has established two charge systems for reducing wastes: a deposit-refund system (established in 1992 for seven business areas) to encourage recycling and apply the "polluter pays" principle and a waste treatment charge system (expanded to nine business types in 1994) for curbing consumption of products and containers that cannot easily be recycled and cause waste management problems. The deposit scheme allows refunds; although refund amounts have risen, at 7.8 percent, the government thinks they are far too low.³⁶ Results of the waste treatment system are not yet clear. Revenues from the two schemes are devoted to a waste management fund managed by the Korea Resources Recovery and Reutilization Corporation.

Since 1994 the government has been actively tracking ISO (International Organization for Standardization) 14000 activities, trends in standardization, and likely requirements. Concern about ISO 14000 as a trade barrier is evident, along with recognition that ISO can help individual firms improve their images.³⁷ Two similar *Environmentally Friendly Companies Acts*, one pushed by MOTIE and the other by MOE, encourage companies to enlist in a voluntary permit program under which they provide extensive information on their production input, processes, and output of materials, resources, and chemicals; if accepted into the program, they are not subjected to spot enforcement checks for three years. Compliance appears motivated largely by a desire to obtain ISO 14000 certification in the future.

Public Information Policies and Laws

Public disclosure policies are undeveloped in Korea; the issue of transparency of laws, regulations, and documents is likely to receive increasing attention, particularly as a part of regulatory reform.³⁸

Environmental Impact Assessment Act, effective 1993. EIAs are required for sixteen specified urban, industrial, and infrastructure or public works projects of a certain size to harmonize environment and development needs. Prepared by the proponent, they must address the environmental impacts of the proposal but not alternatives. Draft documents are available for sixty days for public review; public hearings or presentations are required. Although more than 1,200 EIAs have been prepared, they are viewed largely as administrative actions carried out while other major permits (such as construction) are obtained. EIAs may have mitigating effects on project design; MOE has an interest in improving the EIA system.³⁹ The actual availability of EIAs to the interested Korean public is problematic.

International Treaties

Korea has ratified all the major international conventions concerned with environment.⁴⁰ Signed but not ratified are the Antarctic Environmental Protocol and Law of the Sea conventions.

Legal and Policy Developments of Particular Relevance to Industrial and Urban Environmental Management

- Korea has amended its environmental pollution laws to establish volume-based instead of pollution concentration-based standards for air, water, and solid waste pollution. The new provision will be effective January 1, 1997. Use of these data in policymaking will be of particular interest to other Asian countries.
- *Effluent/emission charges and environmental improvement* policies and laws will continue to receive strong attention within government and by industry associations and the chaebol (Korean conglomerates). Their strong interest in U.S. experiences, within the U.S. Environmental Protection Agency and the states, is already evident.⁴¹
- *EIA requirements and public review and comment practices* are important in developing experiences with public information disclosure and how it can be helpful in improving environmental quality.

5. Urban Environment and Infrastructure

Virtually all water supply and wastewater treatment facilities have been publicly owned and operated; the government is not willing to privatize. Solid waste and hazardous waste facility financing is 55 percent public and 45 percent private, but again privatization is not occurring. Cities are required to locate their own financing, but the government will still oversee the projects once they are launched.⁴² The government has subsidized urban environmental services, including water supply but recently announced that it would deregulate its fees for water and disposal of waste.⁴³

Social Overhead Capital Program

The government has recently stated that it will allow foreign capital to be used by the private sector in so-called "*social overhead capital*" projects, such as high-speed railways, airport terminals, and power

plants. The Private Capital Inducement Act of 1994 facilitates the participation of the private sector in covering budget shortfalls for needed social overhead capital improvements for the period ending in 1997 and especially for social overhead capital improvements for the new century.⁴⁴ Large Korean firms are expected to take part in the infrastructure projects, but build-own-transfer projects are not envisaged, despite chaebol experience with build-own-transfer projects elsewhere in Asia.⁴⁵ Construction companies are expected to benefit the most from this initiative.⁴⁶

The Korean government estimates that the total investment needed to complete its environmental cleanup is more than \$11 billion. In addition, the pollution control and related equipment market is expected to be \$6 billion in 1995 and increase yearly. At national and local levels, governments are encouraging projects relating to remediation, wastewater treatment, air quality enhancements, and environmental efficiencies.

Water Supply

Nearly all of Korea's water comes from surface water, with few reservoirs and little groundwater due to the rocky terrain. Industrialization has dried up many rivers; water is thought to be unpotable everywhere. The government is planning to build fifteen new reservoirs and seven multipurpose dams by 2001. To help clean up rivers for drinking water and industrial needs, the government is planning to invest \$1.5 billion to construct 185 treatment facilities, strengthen monitoring activities, and, by 1998, implement highly advanced purification technologies in downstream areas.⁴⁷

Wastewater

Thirty-two percent of Korea's treatment facilities are operating over capacity. The pollution levels are high; innovative treatment is necessary to deal with agricultural runoff and the waste generated by pig farms. MOE is targeting primary and secondary wastewater facilities for the Han, Nakdong, Keum, and Yeong San Rivers. Interregional pollution issues are critical. For example, Nagdong River wastewater pollution affects Taegue and other cities all the way to Pusan.

Solid Waste

Households generate 75,000 tons of solid waste daily; industry produces another 68,000 tons, of which 19,000 tons is hazardous. Solid waste is disposed of in 590 landfills managed by local governments. Some private solid waste operations exist outside Seoul, but all are publicly owned. Landfill costs are high, however; incineration is becoming increasingly important in Southeast Korea in particular. The government is now committed to financing 50 percent of new incineration opportunities.

Hazardous Waste

Hazardous waste problems are recognized as growing; the Environmental Management Corporation has established six regional zones in which to install an estimated fifteen public hazardous waste incinerators by 2005; the first will be installed in Kunsan. These facilities are considered too expensive for private sector participation.

6. Private Sector and Academia

Chaebol

Some thirty large Korean chaebols (conglomerates) dominate Korean industry. Five of the largest chaebol are multinational corporations—Hyundai, Samsung Group, Daewoo, Lucky-Goldstar Group, and Sunkyung. Many have corporate policies or “charters” that outline a corporate environmental philosophy. Among the leaders is Korea’s largest chaebol, Samsung Group.⁴⁸

Korean Industry Associations

Among the many industry associations in Korea,⁴⁹ the two of importance to US-AEP are the Korean Environmental Preservation Association, which conducts industry training on compliance matters for about 6,000 pollution-emitting member firms, and the Korea Association of Manufacturing Industry, which represents some 1,200 firms, many providers of clean technology, and some 300 largely environmental pollution control equipment manufacturers.⁵⁰

Academic Institutions

Academia/business cooperation is strong. The Institute of Environmental Science and Engineering at Seoul National University, with Doosan Glass, is researching a zero-discharge system for the crystal glass industry and, with Lucky Engineering, is researching the recovery and reuse of precious resources from oil and fat in industrial waste; both projects are funded through the Highly Advanced National (G7) Project. The Korea Institute of Geology, Mining, and Materials with Samsung Engineering Company is researching the recovery and reuse of valuable metals and water from electroplating waste.

Banking Institutions

Much of the banking industry grew out of the financial system that remained after the Japanese occupation. Following the Korean War, the government realized the existing system was inadequate to handle the economic disorder.⁵¹ Toward the end of the 1960s, the government realized the banking system was not able to meet the surging need for investment funds for further economic development. It tried to diversify the sources of investment funds by introducing various nonbanking financial institutions and fostering a securities market.⁵² In the 1980s, to enhance economic efficiency by assigning a greater role to a market-oriented system and promotion of competition in the financial sector, the government denationalized several banks and adopted policies to increase the number of private banks.⁵³

Key Insurance Institutions

“Green insurance” is offered for compensation for physical harm, injury, or death caused by the pollution of Korea’s environment.⁵⁴

7. Environmental Awareness and Public Involvement

General Public Awareness of Environmental Issues

Numerous polls show that clean water and air is the most important public issue in Korea today. As the position of the middle class has solidified and expanded, no longer are most people concerned about

having enough food, clothing, and housing. As Eder notes from his study of Korean environmental management, “[n]o issue is spoken of more often than the condition of Korea’s natural environment.”⁵⁵ In March 1996 President Kim Young-sam pledged that the government would consider environmental protection a top priority in implementing its policies and would be tough on violators of antipollution laws. “We must introduce an eco-friendly mode of production and eco-friendly way of living. This is also needed to increase our economic competitiveness,” he said.⁵⁶

Nongovernmental Organizations

MOE cites the existence of 160 private organizations involved in environmental activities. Of these, 84 are environmental nongovernmental organizations registered with the government, 33 are unregistered environmental groups, and 43 are unregistered with significant environmental activities.⁵⁷ Key groups include the following:

- The *Korea Action Federation for the Environment* is registered, has an annual budget of \$1.3 million and 12,000 members, and is the oldest and largest nongovernmental organization. Its roots lie in the Anti-Pollution Movement Association, Korea’s first purely environmental activist group.⁵⁸ It publishes *Environmental Movement* with a circulation of 20,000.
- The *Baedal Eco-Society* is an unregistered environmental group.⁵⁹ With an annual budget of \$600,000 and 10,000 members, it focuses on the scientific credibility of the environmental movement. It has fifteen chapters around the country with headquarters in Taejon. Its purpose is to give a greater degree of scientific credibility and “substance” to the Korean environmental movement.⁶⁰
- *Citizens Council for Economic Justice* is unregistered. With an annual budget of \$625,000 and 10,000 members, it promotes nonviolent approaches to a variety of issues, not just environmental. Its Center for Environmental Development works to put environmental issues into their social and economic context, forming the ideological parameters of the council’s work.⁶¹

Media/News Organizations

Every major newspaper has at least one environmental reporter; most newspapers feature daily articles on environmental issues. In 1992, 8,884 articles dealt with the environment.⁶² Environmental consciousness is used in mass marketing campaigns, including “clean spring water” and “clean beer.”⁶³

8. U.S. Government Activities

U.S. Agency for International Development

USAID conducts no programs in Korea.

Defense Department

The United States currently has 36,000 troops of the IX Corps, Pacific Command, in Korea, headquartered

in Seoul. Another 39,000 troops are stationed in Japan, bringing the total number of troops deployed in support of Korea's defense to more than 75,000. This represents nearly four-fifths of all U.S. troops stationed throughout Asia and the Pacific and nearly 6 percent of all U.S. servicemen and servicewomen worldwide.⁶⁴

US-AEP Activities in Korea

US-AEP has supported 112 environmental exchanges, processed 591 trade leads, and sponsored 23 technology grants through the National Association of State Development Agencies, in addition to initiatives through the Council of State Governments. With the U.S. Environmental Protection Agency, US-AEP has supported environmental action teams and short-term technical assistance.

9. International Organizations and Bilateral Assistance

World Bank

In 1995 Korea became a World Bank member with 0.41 percent voting power—the first country ever to progress from being a concessional borrower from to a donor for the International Development Association and then to becoming an International Bank for Reconstruction and Development graduate.⁶⁵

Asian Development Bank

Korea ceased receiving Asian Development Bank assistance in 1988 largely due to its economic growth. Korea now contributes to the bank as a 3.5 percent shareholder (compared to the United States, which contributes 10.8 percent, and Japan, which contributes 21 percent).⁶⁶

United Nations

Korea became a United Nations member in September 1991. Recently, a United Nations Development Programme press release praised Korea for “significantly” increasing its contribution. Korea has received no confirmed assistance from this U.N. program or the United Nations Environment Programme.

Other Donors

From 1990 to 1992 Japan's official development assistance fell by more than 60 percent, from more than \$50 million to around \$17 million. Assistance from other countries, such as Germany and France, fell by 30 percent in this period, whereas others, such as Austria, increased their assistance.⁶⁷

10. Opportunities to Support Clean Production and Environmental Management

Policy Framework

Korea's growing integration of environmental and industrial development policies is spurred as much by the chaebol in Korea as by MOE, MOTIE, and other government agencies. Increasing public awareness of and media attention to industrial and urban pollution issues is adding a new dynamic to environmental and industrial policies in the public and private sector. In the policy arena several opportunities stand out.

Environmental information and public participation. One opportunity is to improve the content and dissemination of industrial environmental performance information to various users—financial institutions, government, and the public. Korea's *EIA requirements* provide a way to address locational and clean production issues arising from *new industrial estates* and to provide the public with advance information on which to comment. For existing industries, the *Environmentally Friendly Companies Act* offers opportunities for government to engage volunteer companies in providing essential information on industrial environmental performance. The act offers a basis for exploring ways to improve industrial environmental performance standards and dissemination of information on progress and needs to government, financial institutions, and the public.

Cost-effective environmental management. Several Korean institutions have evidenced strong interest in obtaining the best available information on green accounting, cost-effectiveness of clean technology, and pollution charge systems for revenue and pollution reduction. Strong interest also exists in exchanging experiences with other countries on implementing environmental funds concerned with solid waste, recycling, and environmental improvement and on improved water conservation through demand side management.

Industrial Environmental Management

The thirty large chaebol and their environmental department heads and production managers are key targets for initiatives aiming for ever cleaner production. They will be engaged in meeting needs for new investment in Korea as the country's 20-year-old industrial plant requires replacement, requiring environmentally sound location of new industrial estates and their employment of cleaner production capabilities. Interest in the pursuit of cleaner production is also strong within the Korea Academy of Industrial Technology, Korea Association of Manufacturing Industry, Korea Institute of Science and Technology, and MOTIE.

The environmental cleanup and remediation market will remain an opportunity for U.S. firms to develop in Korea, through, for example, local agents and licensing agreements, local production, and carefully built relationships with Korean firms.

Environmental Infrastructure

The Government of Korea is planning to invest *\$1.5 billion* to construct 185 treatment facilities, strengthen monitoring activities, and by 1998 implement highly advanced purification technologies in downstream areas. This is a *\$900 million* market, of which 98 percent is publicly funded and 2 percent is privately funded. Project opportunities at industrial estates include four associations of industrial estates, mostly in southeast Korea. In Kyungnam Province, seven wastewater facilities worth *\$4.5 million* are to be built on agricultural and industrial estates. New investments, estimated at *\$11 billion* for 1994–2001, will focus mostly on incineration technology but also on construction of 192 landfills.⁶⁸

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Endnotes

1. Nahm (1993, 227, 332).
2. CIA (1995).
3. "Korea Rated 'Second Most Aggressive' in Biz Activity." 1996. *Korea Times* (March 21).
4. Korea has been carefully examining the German reunification experience and the costs of environmental and infrastructure development experienced in East Germany for elements that are relevant to North Korean integration. See Puschra and Chung (1994), which documents proceedings of an international symposium on environmental problems and policies of Germany and Korea.
5. Constitution of the Republic of Korea (Ch. II, art. 35, 1987).
6. The committee has not been active (based on interviews by assessment team, Korea, March 1996).
7. See Korea (1994), a comprehensive and authoritative Ministry of Environment annual report on Korean environmental conditions, trends, and activities. See also Eder (1996), which is a useful, although not up-to-date, account of environmental issues in Korea.
8. Korea's factory land prices are the highest in the world; conversion of agricultural to industrial land use was up 36 percent in 1995 ("Korea Rated 'Second Most Aggressive' in Biz Activity." 1996. *Korea Times* [March 21, 9]).
9. Korea (1994).
10. Puschra and Chung (1994, 8). The US-AEP infrastructure assessment (Gourlay 1996, 69) estimates a \$5 billion market, including central government studies, implementation projects, and industrial estates.
11. Puschra and Chung (1994, 11-49).
12. Puschra and Chung (1994, 65-82). The government subsidizes 30 percent of the cost of water supply. (Gourlay 1996, 76)
13. Korea (1995b).
14. Korea (1995b, 13).
15. Korea (1995b, 26).
16. The new act calls for development of criteria for soil cleanup and remediation and adoption of a "superfund" to carry out the work. It authorizes \$3.5 million for the Ministry of Environment to conduct feasibility studies for the mining sites. Opportunities for application of U.S. technology and know-how are strong. (H. M. Kim, president, Contech Corporation (Seoul) in Washington, D.C. [May 28, 1996]).

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17. Although the Ministry of the Environment has played a critical role in upgrading Korea's environmental standards and enforcement, it suffers from quick turnover in staff and leadership and is less powerful and well staffed than MOTIE. See Lee and Halter (1995, 70).
 18. Lee and Halter (1995, 69).
 19. Lee and Halter (1995, 79).
 20. Among MOTIE's activities are promotion of environmental industry (shared with MOE), development of environmentally sound energy resources and energy conservation strategies, and a new program to shift from petroleum to coal and nuclear power for energy production.
 21. The Ministry of Finance and Economics is considered to be the most powerful of the government ministries. A recent poll rated it first in importance, followed by the Ministry of Environment, which has, at least in public eyes and in terms of future priorities, become more prominent than the Ministry of Trade, Industry, and Energy (H. M. Kim, president, Contech Corporation [Seoul], Washington, D.C., July 1996).
 22. Urban, industrial, residential, agricultural, and mountain lands are zoned under the land-use planning law under the jurisdiction of the Ministry of Construction and Transportation, which does rezoning in conjunction with local governments that do urban land-use planning.
 23. Others of potential importance include:
 - *Environmental Management Corporation*. Responsible for procurement and construction of hazardous and industrial wastewater treatment plants, landfill sites, solid waste treatment facilities, and technical assistance in design and construction of antipollution facilities.
 - *Central Environmental Disputes Coordination Commission*. Established under MOE, the center conducts mediation of environmental pollution damage claims.
 - *Korea Advanced Institute for Science and Technology*. Responsible for the education of scientists, researchers, and technicians in the applied technology field.
 - *Korean Industrial Advancement Administration* Korea's member body to the International Organization for Standardization.
 - *Environmental Officials Training Institute*. An independent education and training center designed to meet environmental personnel needs.
 24. Some 231 billion won (\$312 million) will support Highly Advanced National (G7) project research and development for pollution cleanup, prevention, and clean technology projects. This effort is coordinated by NIER, with a budget of \$47 million in 1996 (\$20 million from the government and \$25 from private industry). About fifty institutions receive funds.
 25. NIER monitoring functions were given to local government as part of devolution, but they were taken back within a year (NIER, Seoul, March 1996).
 26. The current president is an economist from the Korea Development Institute. The current staff of forty-five includes twenty-one with PhDs, half in science and technology and half in economics and management. Support comes mostly from MOE but also from the Ministry of Finance, with whom the president has strong links (NIER, Seoul, March 1996).

Endnotes

27. Designed to preserve and clean up the nation's environment, it superseded the previous (seventh) five-year plan and is more liberal and tuned to free trade.
28. Korea (1995b).
29. See Lee and Halter (1995, 72–79).
30. Constitution of the Republic of Korea (Ch. II, art. 35, 1987).
31. Korea (1994). See summary of laws in appendix entitled “Environmental Laws” (289–92) and chapter 15, “Improvement of Related Laws and Regulations.”
32. Enforcement actions attract attention in the media. See “504 Business Firms, Buildings Caught Releasing Excessive Pollutants in Jan.” *Korea Times* (March 1, 1996).
33. The government has established dedicated telephone lines in Seoul and the provinces and has published its online address for receiving citizen complaints. See “Citizens Encouraged to Report Environmental Contamination Thru Phone, Fax, PC Lines,” *Korea Times* (March 1, 1996).
34. Environmental Dispute Settlement Act. See Korea (1994, 289–92), appendix, “Environmental Laws.”
35. Korea (1994, 226).
36. Korea (1994, 126).
37. Korea (1994, 182, 183).
38. Kim (1996, 14).
39. Korea (1994, 213–17). The assessment team was unable to review the practical application of EIAs in Korea, availability of EIAs to the public, effectiveness of public presentations and public hearings, and degree to which the EIA process offers a meaningful opportunity for public participation.
40. Treaties ratified are those on biodiversity, climate change, endangered species, environmental modification, hazardous waste, nuclear test ban, ozone layer protection, ship pollution, tropical timber, and whaling.
41. The Samsung Group, for example, sent Senior Economist Dr. Jin Taek Whang of the Samsung Global Environment Research Center to the United States to investigate the workings of tradable permits and other market-based incentives (Dr. J. T. Whang, Washington, D.C., April 1996).
42. Korea's six major cities—Seoul, Inchon, Pusan, Taegu, Taejon, and Kwanju—have the means to find their own financing.
43. “Gov't to Offer Incentives to Environment-Friendly Firms, Deregulate Prices of Water, Garbage Disposal.” *Korea Times* (March 22, 1996), p. 3.

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44. Private companies participating in social overhead capital projects to be financed with more than \$1.3 billion each in private capital will be allowed to introduce foreign cash loans of up to \$100 million per project or up to 20 percent of the total cost for each project. They will also be able to receive long-term loans (for ten years) from domestic banks; bank loans of the nation's ten largest business groups will be excluded from the government's credit controls when the ten largest business groups obtain the bank loans for the first-class social overhead capital projects (building new roads, Seoul-Pusan high-speed railroad, port facility, new airport construction, and so on) to be financed with private capital. The Korean government has allowed private firms participating in social overhead capital projects to undertake auxiliary projects, such as development of residential areas and tourist attraction sites and tourism industrial estates (Gourlay 1996, 74).
45. Gourlay (1996, 74). The central government has financed, with chaebol assistance, construction of a variety of municipal projects including sewage systems in Kwangju and Mokpo and a new port and environmental improvement project for Pusan, presumably with World Bank assistance. The chaebol are asked to participate in large programs by building and operating a specific piece.
46. See "Social Overhead Capital in Korea," *Korea Money* (February 1995). Three tiers categorize these projects:
- *First-class projects* (12), including transportation, water supply, sewage, garbage dump, and telecommunications facilities. These will be owned by state and local governments.
 - *Second-class projects* (18), including cogeneration power plants, gas supply, wastewater disposal plants, livestock wastewater disposal systems, recycling facilities, and urban park facilities.
 - *Auxiliary projects* (9), including housing construction, land development, urban planning, and industrial complex facilities. These will be privately owned.
47. The Ministry of Construction/Water Resources Authority plans overall water needs.
48. In 1992 *Samsung* announced establishment of the Samsung Protection Charter, which commits the company to an integrated approach to manufacturing and environmental management. Samsung also made a commitment to be in full compliance by 1997 with its own global environmental standards, which are considered to be twice as restrictive as the current government domestic environmental guidelines and which Samsung believes are less strict than U.S. standards. Also in 1994 the *Lucky-Goldstar Group* inaugurated its "Goldstar System," which incorporates environmental conservation, management, and quality in all its corporate activities. It has established an environmental committee composed of senior managers from across the firm and chaired by a vice president. Lucky-Goldstar's company, Honam Oil, has consulted with CH2M Hill for help with environmental planning efforts. The *Hyundai* and *Daewoo* Groups have adopted similar voluntary environmental standards or charters.
49. See CIEL (1994), which in its final feasibility report to US-AEP lists the following organizations without comment: Korea Pollution Control Association, Korean Industrial Wastewater Treatment Association, Korean Scientific Research Committee, Korea Environmental Measurement Association, Korean Society of Noise and Vibration Engineers, Korean Toxic Management Association, Korean Air Pollution Research Association, Korean Environmental Research Institute, and Asia-Pacific Environment and Management Institute.

Endnotes

50. Korea Association of Manufacturing Industry administers a \$23 million fund to give loans to suppliers and buyers of environmental equipment at 7 percent interest for a three-year period with a return during five years. Local firms are allowed to buy U.S. equipment but not from Europe or Japan.
51. KoreaNet, Bank of Korea, was established on June 12, 1950. After the war, its primary task was the financing of necessary industrial and agricultural projects for economic rehabilitation. The Korea Development Bank was established in 1958 to continue with post-war industrial/agricultural development. The Korea Agriculture Bank, established in 1956 provides loans to farmers and small business (information from KoreaNet's now inactive home page).
52. These include the Korea Long Term Credit Bank, formerly the Korea Development Finance Corporation; the Export-Import Bank of Korea, which was established to facilitate financial support of exports and overseas investment; and the Securities and Exchange Commission and Securities Supervisory Board, established in the 1970s to oversee the sound operation of the market (information from KoreaNet's now inactive home page).
53. The following were denationalized: Hanil Bank (1981), Korea First Bank (1982), Bank of Seoul and Trust Company (1982), Chohung Bank (1983), Commercial Bank of Korea (1972), Korea Exchange Bank (1989); all have passed to private hands. Newly established during the 1980s were Shinhan Bank, Boram Bank, Donghwa Bank, Dongnam Bank, and Daedong Bank, which are all private (information from KoreaNet's now inactive home page).
54. Eder (1996).
55. Eder (1996). Political response to environment, including the President's announcement of environmental priorities in the government ("Korea Rated 'Second Most Aggressive' in Biz Activity." *Korea Times*, March 21, 1996), reinforces the changed public interest in environment.
56. *Korea Times* (March 22, 1996), p. 2.
57. Korea (1994, 267).
58. See Eder (1996). Founder and Secretary General Choi Yeoul is among the best known of the environmental antigovernment dissidents.
59. Eder (1996). Founded by Dr. Jang Won, who has a Ph.D. in environmental science from Drexel University. Its current president is Dr. Rho Young-Hee, the retired founder of Seoul National University's Graduate School of Environmental Studies.
60. Of relevance to US-AEP is Baedel Eco-Society's cooperation with other Korean and Asian nongovernmental organizations in a program partially funded by The Asia Foundation to inform the public about the environmental problems of the international timber trade caused by Korea.

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61. Other organizations engaged in environmental activities include the following:
- The *Young Men's/Women's Christian Associations* (YMCA/YWCA's) environmental efforts have included public awareness campaigns and joint river cleanup campaigns with Samsung. MOE's special advisory council of nongovernmental organizations is chaired by Kang Moon-Kyu, the chair of Korea's YMCA.
 - *Catholic Church* efforts, similar to those of the YMCA/YWCA, center largely around public awareness and recycling/neighborhood cleanup campaigns.
62. Eder (1996). Skills in environmental investigative reporting are limited; however, it is customary for reporters to seek government approval before covering a major environmental pollution event.
63. Hite Beer captured 16 percent of the beer market by introducing its product as "clean beer" (Eder 1996)
64. DefenseLINK, (September 30, 1995).
65. That milestone was reached on March 3, 1995, with the signing of its two final loan agreements with the International Bank for Reconstruction and Development (World Bank 1995). The World Bank approved three Korean projects during fiscal 1995:
- Waste Disposal Project (December 1994) \$75 million
 - Pusan Urban Transport Management Project (December 1994) \$100 million
 - Ports Development and Environmental Improvement Project (September 1994) \$100 million
66. To gain operating capital, the Asian Development Bank has issued a Korean 80-million-won public bond, the first of its kind by a foreign investor. The seven-year, liquid bond is oversubscribed by more than twice the issue amount. The bond issue not only raises capital for the bank but establishes, among other things, a framework and liquid benchmark to be used by both domestic and offshore bond issuers in the Korean won bond sector. This is a valuable step along the way to establishing an effective capital market and the opening of environmental infrastructure bond issues (information from bank press releases).
67. Japan (1994).
68. Currently, the estimated potential in Seoul is \$250 million, of which 55 percent is public and 45 percent is private. A \$5 billion project for the Nanji landfill is 14 kilometers outside of Seoul. Landfills will amount to \$640 million in project opportunities. Eight incineration facilities are under construction in Mokdong, Ssanggye, Kangnam, Mapo, Chungdong, Ilsan, and Pundang Sanbon regions. Twenty-eight facilities are planned for several cities after 1995; Kunpo City is soliciting for a \$20 million project.

country
assessment:
MALAYSIA

Prepared by:

US-AEP



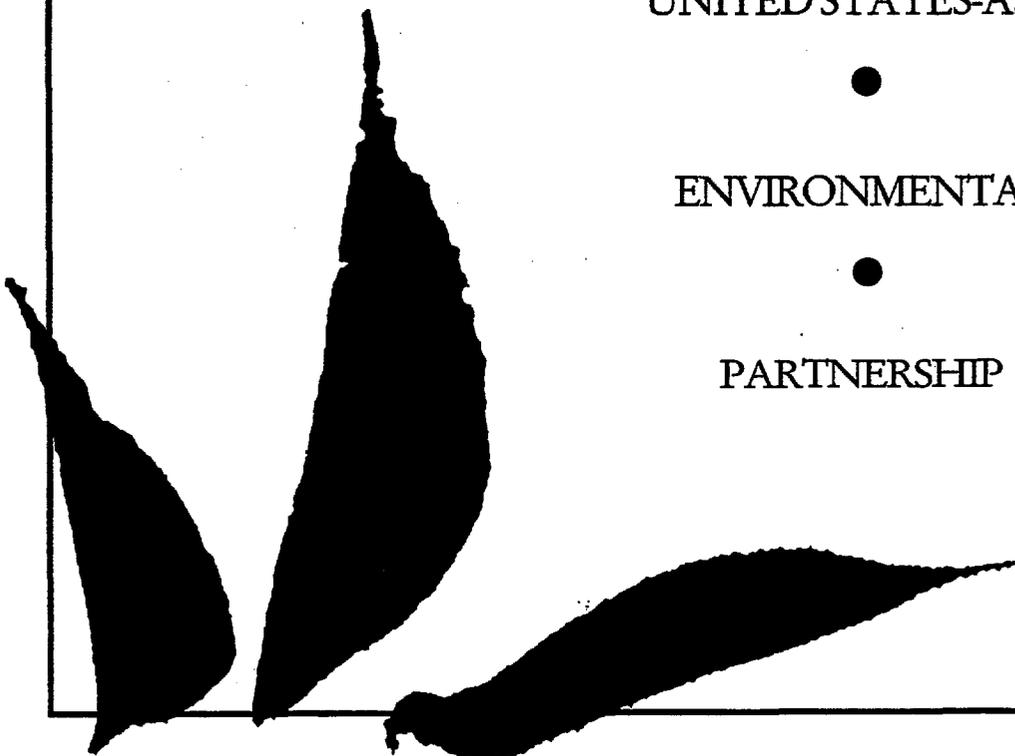
UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



Malaysia

By Malcolm Forbes Baldwin

Slightly larger than New Mexico, Malaysia shares the Malay peninsula with Thailand to the north (Peninsular Malaysia) and one-third of the island of Borneo with Brunei and Indonesia. With nearly 20 million people, Malaysia has been Asia's fastest growing economy after China—more than 8 percent a year since 1987; Kuala Lumpur rivals Singapore in its efforts to attract investment and manufacturing. After shifting rapidly from its earlier economic base in palm oil and rubber, Malaysia's electronics and electrical manufacturing now makes up 40 percent of its economy. Malaysia now grapples with the challenges of rapid growth, virtually full employment, and export dependence. Backed by growing public and business environmental awareness, the government is steadily integrating its industrial development programs with new environmental policies and laws and improving environmental monitoring and enforcement.

1. Economic Profile

Demographic Conditions and Trends

Malaysia's current population of 19,723,587 is concentrated on Peninsular Malaysia, which has approximately 15 million inhabitants. Fifty-four percent of all Malaysians live in urban areas; population density is approximately 56 persons per square kilometer.¹ Malay and indigenous populations (Bumiputra) make up 59 percent of the population; ethnic Chinese and Indian minorities account for 32 percent and 9 percent respectively.²

Economic Conditions and Trends

After more than a decade of promoting public sector growth (1970 into the early 1980s), Malaysia began to push privatization; rapid growth caused the per capita gross national product to rise from \$2,424* in 1990 to \$4,698 today.³ Malaysia is ranked fourth in competitiveness among countries that do not belong to the Organisation of Economic Cooperation and Development and seventeenth in the world, ahead of Taiwan. The Association of Southeast Asian Nations (ASEAN) is its largest partner, of which Singapore is by far the largest.⁴ Malaysia primarily exports to Singapore (21 percent) and the United States (21 percent), followed by Japan (12 percent); Malaysia primarily imports from Japan (27 percent), followed by the United States (17 percent) and Singapore (14 percent). Malaysia's highest export growth has been in textiles, followed by electronics (25 percent and 21 percent respectively); electronics dominates manufacturing in output, export earnings, employment, and investment.⁵

Malaysia has been a phenomenal economic development success story.⁶ In 1994, its eighth year of growth in gross domestic product (GDP) of more than 8 percent,⁷ the nation was the fastest growing economy in Asia after China. During the past twenty years, the country has moved steadily from having an economy based on agriculture and commodities to one based on manufacturing. It quickly diversified into resource processing, high technology, and export industries with the active participation of the private and public sectors.⁸

* Unless otherwise indicated, all dollar amounts indicate U.S. dollars.

acronyms

ASEAN	Association of Southeast Asian Nations
DOE	Department of the Environment
EIA	Environmental impact assessment
EQA	Environmental Quality Act
GDP	Gross domestic product
ISO	International Organization for Standardization
MICCI	Malaysian International Chamber of Commerce and Industry
MIDA	Malaysian Industrial Development Authority
MITI	Ministry of International Trade and Industry
MOSTE	Ministry of Science, Technology, and Environment
NGO	Nongovernmental organization
SIRIM	Standards and Industrial Research Institute of Malaysia
US-AEP	United States-Asia Environmental Partnership

Malaysia's major industries are rubber and palm oil processing, manufacturing and light manufacturing, electronics, tin mining and smelting, logging and processing of timber, and petroleum production and refining. Malaysia's trade with ASEAN countries shifted from mineral fuel exports in the early 1990s to machinery and transport equipment. Imports from the European Union have increased.⁹

Malaysia's economic growth has put an enormous strain on its basic infrastructure. In 1991 Prime Minister Mahatir implemented Vision 2020, a thirty-year plan to make Malaysia a fully developed country.¹⁰ Vision 2020's ambitious goals have created fears about Malaysia's ability to maintain high-growth levels in the long term. Ultimately, the problem is rapid economic growth itself. The government projected at least 8 percent growth for 1996,¹¹ but, within the last two years, Malaysia has experienced growing labor shortages that may, among other causes, affect future growth.¹² Malaysia recognizes that it is no longer in a competitive location for labor-intensive industries.¹³

2. Environmental Profile

Industrial and Environmental Development Background

Malaysia's economic growth has evolved through roughly four stages during the last four decades: in the 1960s, import substitution; in the 1970s, an export push; in the 1980s, resource development and trade; and, in the 1990s, high technology and creative innovation.¹⁴ Growth of manufacturing tells Malaysia's economic story dramatically. In 1996 manufacturing will make up much more than one-third of GDP, a

60 percent increase in only ten years. Although the economy grew at 8.7 percent for 1994 overall, the industrial production growth rate was 12 percent. Agriculture now accounts for only 16 percent of GDP. Manufactured goods make up roughly 55 percent of Malaysian exports. For the most part, investment in manufacturing has come from private sources.

To keep pace with growth, the government has initiated an aggressive campaign to privatize many government functions. A Seventh Malaysia Five-Year Plan (1996–2000)¹⁵ continues the government's major privatization initiatives in public sector areas, including energy, transportation, and communications. The new economic plan is reported to recommend support for seven key high-tech industries, including aerospace, biotechnology, and electronics.¹⁶

Environmental Conditions

Although Malaysia has its share of environmental problems from mining and timbering, industrial pollution receives increasing attention. Rising levels of air pollution from increases in total suspended particulates are one problem¹⁸; overall deterioration of river water quality is another.¹⁹ Although sewage and animal wastes are the largest contributors of organic water pollution,²⁰ the Government of Malaysia estimates the following breakdown of industrial polluters: food processing (40 percent), rubber and palm oil industries (35 percent), industrial chemicals and electronics (12 percent), and textiles (9 percent). The major industrial sources of water pollution are concentrated on the west coast of Peninsular Malaysia, with nearly 50 percent of the major sources found in the states of Selangor, Johor, and Penang.²¹

Environmental Trends and Issues

Malaysia's major environmental problems have grown as well. Those that are most critical are:

- Vehicular and industrial air pollution
- Water pollution discharges into Malaysia's rivers and coastal areas
- Hazardous waste, including toxic discharges of all types
- Deforestation

Trends in manufacturing in Malaysia strongly suggest that hazardous waste will become the principal industrial pollution problem in coming years.²²

Conservative estimates of Malaysia's environmental goods and services market totaled \$610 million for 1994. Of this, water treatment and supply equaled roughly one-third of the total, followed by wastewater treatment (municipal and industrial) at 25 percent and environmental services at 25 percent; solid waste management at 6 percent; hazardous waste management at 7 percent; monitoring and analytical equipment at 3 percent; and air pollution at 1 percent.²³

3. Government

Since independence in 1957, Malaysia has been a model developing country; political stability has been a key asset. Malaysia has worked ceaselessly toward economic development²⁴ and social integration.²⁵ Environmental factors became part of government policy with the Environmental Quality Act of 1974, but significant environmental regulatory and management changes only occurred by the mid-1980s. Today, however, environment is recognized as a key factor in attracting industry as well as providing for its citizens.²⁶

As a federal system, the government has jurisdiction over most business issues, but land and water matters,²⁷ which relate to local government, come under the constitutional list of state functions.²⁸ Federal ministries exercise the significant policy, budgetary, and regulatory powers, but devolution of environmental authorities for enforcement and management of environmental laws to the states is proceeding.²⁹

Key Ministries

The *Department of Environment (DOE)* in the *Ministry of Science, Technology, and Environment (MOSTE)* is primarily responsible for standard setting, monitoring, and, with the states, enforcing pollution regulations. Air pollution is one of DOE's major concerns; river, coastal, and marine water quality is next, although DOE's jurisdiction over these matters is limited in the federal-state system. The government takes samples from selected rivers to monitor heavy metal contaminants, including arsenic, cadmium, mercury, and lead. MOSTE also supervises the environmental impact assessment (EIA) process, which is required for listed projects and is receiving increasing emphasis.³⁰ Because DOE's staff numbers 572, of whom 200 are inspectors,³¹ business does not perceive DOE regulations and enforcement to be strong.³² But DOE has an improving record of enforcement³³ as well as industry compliance,³⁴ although DOE must rely increasingly on strong state cooperation and competence.³⁵ Cooperation between industrial associations and government in environmental matters has generally been effective; it helped, for example, to reduce pollution from the rubber and palm oil industries beginning in the mid-1980s.³⁶

The *Standards and Industrial Research Institute of Malaysia (SIRIM)*, which was recently privatized, has operated under MOSTE. It is the Malaysian parastatal institution for the ASEAN Consultative Council on Standards and Quality and the office charged with ISO (International Organization for Standardization) 9000 certification.³⁷ Soon, SIRIM will be the certification body for ISO 14000 as well. To prepare for this role, it has more than thirty companies on a pilot scheme for ISO 14000 certification and has been doing auditing since December 1995.³⁸ A SIRIM program on small- and medium-sized enterprises is funded by Denmark concerning clean technology for the electroplating, food, and textile industries.³⁹ A problem for SIRIM is that multinational corporations that come to establish a clean plant may subcontract the dirty parts of their operations, for example, for electroplating, to small- and medium-sized enterprises. SIRIM plans to identify these problems and look into subcontractor arrangements and ways that multinational corporations can influence their subcontractors under ISO 14000 standards through contractual measures.

The *Ministry of International Trade and Industry* (MITI) plays the key role in industrial development and international trade for Malaysia; it operates throughout the country and has offices in eleven countries, including the United States. Among MITI's duties is preparation of an extensive annual report⁴⁰ and its industrial master plan (see section 4 on policies and laws). Small- and medium-sized enterprises, of which 25,000 are registered,⁴¹ are major subcontractors to multinational corporations and are of particular interest to MITI in its effort to reduce the materials that multinational corporations must now import. Currently, small- and medium-sized enterprises rely largely on technology from abroad; the smallest depend on Japan, Taiwan, and China.⁴² MITI's Industrial Technology Assistance Fund is available for small- and medium-sized enterprises with revenues of less than \$1 million a year to obtain funds for ISO 9000 certification,⁴³ but the fund is not as yet available for ISO 14000 certification.

MITI recognizes environment as a major policy concern and pollution minimization as an economic as well as environmental benefit. The ministry is telling industry that pollution will cost them and that, if exports are to grow, they must adopt ISO 14000. MITI expects SIRIM to lead this effort. The ministry is also anxious to have the integrated hazardous waste facility completed quickly, because these wastes are increasing and on-site storage and lack of a treatment facility could be a barrier to industry. MITI offers special tax allowances for pollution control for all industries seeking to establish waste treatment facilities, but few have taken advantage of the offer. As a signatory to the Montreal Protocol on Ozone-Depleting Substances, MITI encourages Malaysia's active program to pursue chlorofluorocarbon substitutes and phase out ozone-depleting substances by 2000, ten years before it is required.⁴⁴

The *Malaysian Industrial Development Authority* (MIDA) is a key agency within MITI that is responsible for promoting and coordinating industrial development. It has fifteen overseas offices, including three in the United States. Under the Promotion of Investments Act (1986), MIDA gives tax holidays and allowances to encourage proper storage, treatment, and disposal of hazardous waste.⁴⁵ MIDA also extends import duty and sales tax exemptions for machinery, equipment, raw materials, and components for the storage, treatment, and disposal of hazardous waste.⁴⁶ Interaction between DOE and MIDA is also effective and backed by EIA requirements and DOE certification, as illustrated by the active engagement of a senior DOE official in MIDA's offices.⁴⁷

Other Institutions

Research and development agencies. The government has placed considerable emphasis on improving Malaysia's research and development capacity.⁴⁸ Research is conducted by the Malaysian Institute of Microelectronic Systems, Malaysian Agriculture Research and Development Institute, SIRIM (see above), Palm Oil Research and Development Board, and Forestry Research Institute of Malaysia. The government lists key sectors for research as agriculture, industry, medical, strategic, and social science. In agriculture, the focus is on land use research, postharvest management, and environmental research (including afforestation and agricultural waste management). In industry, efforts related to the environment include microbial metal recovery from industrial and agricultural waste. Medical research activities include toxicology issues.

4. Policies and Laws

Environmental Policies and Laws

Malaysia's environmental regime was established under the Environmental Quality Act (EQA) of 1974, which contains enabling provisions for air, noise, and water pollution; degradation of land; and oil pollution.⁴⁹ Fifteen regulations have been enacted under EQA, the latest intended to address growing environmental threats from hazardous waste.⁵⁰ Several amendments proposed for EQA were implemented in 1995 to empower enforcement activities, including an increase in prison terms and fines, stricter emission standards, auditing requirements, and power to close down polluting factories.⁵¹ The government also recently completed guidelines for the management and disposal of petroleum wastes, zoning and site regulations, and burning of timber. DOE continues to seek ways to improve its monitoring of compliance with its ambient air and water quality and effluent and emissions control standards.⁵²

Malaysia's Parliament passed important new amendments to EQA in June 1996. They establish substantially higher penalties for pollution violations, authorize DOE to order polluting firms to engage a third party to conduct environmental audits, allow DOE to close plants if they appear to cause risks to public health, and authorize DOE to collect a tax from industries for waste they generate for an environmental fund for research, conservation, and pollution prevention.⁵³ The Environmental Quality Council formed under EQA is the body responsible for recommending environmental policy for legislation. The council includes members of the federal and state governments, academia, the private sector, and nongovernmental organizations (NGOs). As a regular monitor and influence on the environmental management regime, however, the council is not highly effective.⁵⁴

EIAs have become a key part of Malaysia's efforts to prevent or minimize pollution and other environmental costs before projects are approved. Malaysia requires EIAs for more than thirty-five different activities, including energy, transportation, infrastructure, agro-industries, waste treatment, and disposal projects.⁵⁵ The number of EIA reports submitted to DOE⁵⁶ has increased every year, whereas the average time for review has steadily decreased.⁵⁷ Illustrating the procedural if not substantive importance of EIAs, a recent decision by Malaysia's Supreme Court held up approval of the controversial Bakun Dam, pending compliance with EIA requirements by the federal, not simply the state, government.⁵⁸

Although the environmental regime has become increasingly strong, continued progress with command and control approaches entails several problems. The most immediate is the government's devolution policy. Serious enforcement of environmental regulations will require substantially increased training of staff at the state and local levels.⁵⁹

The command and control approach also raises budgetary concerns. Although the government reported a modest budget increase for DOE from 1994 to 1995 of 12 percent,⁶⁰ interest in more cost-effective techniques is strong.

Industrial Policies and Laws

Malaysia's integration of environment and clean technology into industrial economic development policies is progressing but at an early stage. The pursuit of a clean technology policy and environmentally linked economic policy has not yet shaped MITI's policy and programs; MITI reflects concern about environment far more as a problem than an economic and social opportunity. MITI's industrial master plan for 1996–2005, soon to be completed, has several elements that might but do not yet incorporate clean technology policy approaches. First, the plan promotes value-added knowledge and technology-intensive industries within the manufacturing sector; industrial strategy will promote specific competitive and efficient industries. Second, given high employment and a serious shortage of technically skilled labor, MITI emphasizes the need to increase these skills.⁶¹ Third, MITI is promoting the development of what are called “growth triangles” with: Indonesia, Malaysia, and Thailand; Indonesia, Malaysia, and Singapore; and Indonesia, Malaysia, and the Philippines. Each set of three countries is seeking to foster growth in locations subject to industrial development plans in which joint ventures will foster trinational goals and industry can have access to local labor. Fourth, the Action Plan for Industrial Technology Development identifies six priority technologies for development⁶² to overcome the lack of indigenous technology capabilities and reliance on multinational corporations, the slow rate of technology transfer to Malaysia, and its low research and development investment to date.⁶³

Recently, Malaysia has implemented a number of market-based incentives, including fees, tax reductions, and deposit-refund systems.⁶⁴ An intergovernmental committee on economic instruments, established in 1996, is working with the assistance of a foreign consultant to examine ways to apply market-based instruments based on the experiences of other countries; a program for implementation is anticipated in late 1996.⁶⁵

Public Information Policies and Laws

Malaysia follows its British heritage in maintaining laws and policies that restrict the free flow of government-held information. Although some efforts have been made to establish an American-style Freedom of Information Act, the Official Secrets Act of 1972 and other laws restrict information⁶⁶; however, detailed EIAs, of which some ten to twenty are prepared each year, involve an extensive dialogue during preparation with representatives of affected communities, among others. The committee that reviews detailed EIAs also includes representatives of NGOs. Detailed as well as the more numerous (200 or more per year) preliminary EIAs are available to the public.⁶⁷ All are submitted to agencies for a maximum two-week review.

5. Urban Environment and Infrastructure

Malaysia's privatization program is one of the most ambitious and successful in the world and results from calculated government policies to (a) reduce financial and administrative costs to government, (b) increase competition, efficiency, and productivity, (c) accelerate economic growth, and (d) reduce the size of the public sector. Privatization has concentrated on roads, electric power, water, wastewater, solid and

hazardous waste, seaports, and rail. Although the process has been successful for implementing privatization projects quickly, some have criticized the procurement system for favoring large and politically connected companies. The government does not encourage open competition; it prefers to judge privatization awards based on the economic viability of the project and usually “invites” short lists of companies or consortia to present detailed project proposals.

Water

The privatization of drinking water began in 1989; total then for this sector reach \$1.3 billion. On water matters, state authorities continue to take precedence over the centralized government. Individual contracts for build-own-transfer water supply and treatment facilities have been awarded in most states; most of the concessions have gone to French and British firms.

Wastewater

Between 1974 and 1988, a number of different master plans were developed for wastewater services. Progress was stalled by inadequate financing or lack of skilled manpower, including plant operators and managers. In 1993, however, the Sewerage Services Act was passed, allowing the federal government to assume responsibility for sewerage systems and services, licensing charges, and regulation for the whole country. That same year, a 28-year, \$2.25 billion concession for a national sewerage system was awarded to Indah Water Konsortium, a British-Malaysian joint venture.⁶⁸ This project is Malaysia’s costliest contract awarded to date (although the Bakun dam will be costlier) and will be the world’s largest single sewerage project.⁶⁹

Solid Waste

The National Solid Waste Management Plan divides the country into four zones or regions and includes privatization of comprehensive services, including storage, collection transfer stations, recycling facilities, green waste composting, waste to energy, and sanitary landfills. Types of waste handled will include residential, commercial, institutional, and some industrial. Four joint ventures have been short-listed out of the original forty groups who bid for the project.⁷⁰

Hazardous Waste Management

Of all environmental projects to date, the \$150 million National Toxic Waste Treatment and Disposal Center—Malaysia’s first integrated hazardous waste management plant to be built at Bukit Manans near Port Dickson—has had the most difficulty. Physical work on the project finally began in July 1995.⁷¹

6. Private Sector and Academia

Industry/Trade Associations

Private sector constituencies are well established for all of Malaysia’s major industries, which are represented by a number of trade associations. The most active are fully aware of or in varying degrees engaged in environmental management improvement or clean technology application efforts; they work closely with

government agencies, including DOE.⁷² Environmental management awareness and action within the industrial sector is led by the large companies.⁷³ Driving the responses of large companies are several factors: (a) rising standards for clean air that are even higher than in the West, (b) concern for corporate image by managers both as a matter of policy and responding to media attention on polluters and the fear of adverse publicity, and (c) rising tariff rates for electric power that have increased substantially and are expected to increase more.⁷⁴ Enforcement has not been as significant a motivator for large companies, whereas below-market-price water consumption rates (M\$1.3* per cubic meter) are no incentive for water or wastewater reduction.⁷⁵

The *Malaysian International Chamber of Commerce and Industry* (MICCI), now 59 years old and located in Kuala Lumpur has branches in four other cities, is a member of the National Chamber of Commerce and Industry of Malaysia, and has close links with the Singapore Chamber of Commerce. Its large corporate members are interested in ISO 14000, motivated in part by concerns that, if they are not serious about it and competition is, they will be left behind. On the other hand, members recognize that government support of ISO 14000 can help keep competitors from taking advantage of environmental noncompliance. MICCI has initiated an active ISO 14000 program for chief executive officers and managers in conjunction with the upcoming requirement for environmental audits.⁷⁶ Informal agreements among competitors on supplier requirements are seen as useful, although they have not yet developed. Some initiatives have occurred, however, such as a paper recycling agreement among members. Responsible care is incorporated in Malaysia; thirty companies have signed up to embrace a code of conduct for MICCI membership. Some multinational corporation members are looking forward to upcoming occupational safety and health standards (ISO 2000), on which a workshop has been scheduled in the fall of 1996.⁷⁷ Among the key industrial associations concerned with environmental management are the following⁷⁸:

The Federation of Malaysian Manufacturers has many more than a thousand members, of whom half are small- and medium-sized enterprises and most are locally based. The federation's environmental program is not active but does have large multinational corporations such as Nestle and Motorola. They, like other multinational corporations, subcontract with small- and medium-sized enterprises as suppliers and have active programs for environmental improvement.⁷⁹

The *Business Council for Sustainable Development* has seventy corporate members, including large multinational corporations, and was established in 1992 as an NGO. Small- and medium-sized enterprises are welcome to join, but they have not been highly responsive. The council is a member of the Environmental Quality Council. Members are BP, Shell, Guthries, Nestle, and other multinational corporations. The council is not affiliated with the World Business Council for Sustainable Development, because fees are expensive and its goals are not necessarily Malaysian oriented. Malaysia's concerns are with ISO 14000 and how to counter its costs and be competitive. The Business Council for Sustainable Development is interested in clean technology that enhances competitiveness and efficiency and in the effective use of EIAs. It is engaged in developing environmental management awards for multinational corporations and small- and medium-sized enterprises.⁸⁰

* In January 1997, M\$1 equaled approximately US\$0.403.

The *Malaysian Industrial Group on High Technology*, whose creation was sparked by the Malaysian Business Council headed by the prime minister, is a high-level policy group representing large industries (now open to multinational corporations) and government (including the Economic Planning Unit, MITI, and DOE). The group, whose patron is the prime minister's science advisor, has not yet become active in the environmental arena, but its actions in framing government telecommunications and policy and tax incentives have led to government action. The group's task force on reuse and recycling may lead to action.⁸¹

Other associations represent specific industry sectors, including the *Malaysia Iron and Steel Industry Federation*, which is active in environmental matters,⁸² and those concerned with electronics, textiles, and other key manufacturing interests.⁸³

Private Research/Academic Institutions

Environmental Management & Research Association of Malaysia is a national environmental research and management association dedicated to protecting and improving environmental quality. It includes engineers, scientists, managers, and members of the public to (a) identify environmental problems, (b) mobilize professional opinion, (c) hold technical and scientific meetings and exhibitions, (d) identify areas of research, and (e) assist in technology transfer.

The Institute of Strategic and International Studies is the secretariat to the Malaysian Business Council, which represents NGOs, large businesses, and labor and is headed by the prime minister. The institute was involved in preparing the Industrial Technology Action Plan of MITI that on completion in 1990 did not include energy and environment, both topics to be included in the next plan. It has worked with DOE on environmental policy development and encouraged public participation in the policy development process.⁸⁴

The Institute for Environment and Development, known as LESTARI, which means sustainable development, was established in 1994 by the Ministry of Education as a research institute. It focuses on urban environment and natural resource, land use, and community issues, but its director is engaged with environment, industry, and trade as well. As a new entity located at a suburban campus of the University of Malaysia with multidisciplinary support from various departments, it intends in the near term to focus on sustainable development research more than policy analysis; state governments have applied to it for assistance.⁸⁵

Academic institutions. Malaysia has a well-established higher education system. The University of Malaya (1962), the University of Science (Sains) Malaysia (1969), Universiti Kebangsaan Malaysia (1970), and the University of Technology Malaysia (1972) are the largest and oldest of the thirteen major academic institutions.⁸⁶

Banking institutions. Malaysia's banking system is dynamic and highly developed. It is comprised of the Bank Negara (the Central Bank), commercial banks, merchant banks, finance companies, the National Savings Bank, the Islamic Bank, development finance institutions, and other financial intermediaries such

as unit trusts and the provident fund.⁸⁷ U.S. banks currently operating in Malaysia are Citibank, Chase Manhattan Bank, Bank of America, and Security Pacific Bank. A growing number of private infrastructure projects are being financed exclusively by Malaysian banks. In addition, Malaysian banks are aggressively seeking regional investment opportunities.⁸⁸

Key insurance institutions. Foreign direct insurers cannot establish branches or subsidiaries in Malaysia. Moreover, no new insurance companies are being licensed. Equity participation by foreign companies in existing insurance companies is limited to a minority share, normally 30 percent, although Bank Negara sometimes grants exceptions.⁸⁹

7. Environmental Awareness and Public Involvement

General Public Awareness

The development of Malaysia's middle class has led to vastly increased public concern for the environment. Press and other media coverage has been increasingly active and thorough on controversial issues, to which the government has responded. The Seventh Malaysian Five-Year Plan emphasizes environmental awareness as a high priority; DOE is increasingly engaged in environmental education and awareness and includes education and awareness activities in yearly planning. Environmental education is required in Malaysian public schools.⁹⁰

Nongovernmental Organizations

Leading environmental NGOs are primarily engaged in "green" issues. They include *Sahabat Alam Malaysia*, *Friends of the Earth-Malaysia*, the *Environmental Protection Society of Malaysia* (whose president currently sits on DOE's Environmental Quality Council), and the *Consumers' Association of Penang*, an environmental consumer advocacy group that educates the public about environmental issues through its nationally circulated publication *Utusan Konsumer*. The Consumers' Association of Penang also responds to environmental complaints on behalf of community members through its legal center.⁹¹

Media/News Organizations

Both the media and environmental NGOs are active participants in environmental awareness activities and policy debates. For example, the *New Straits Times* has reported on a number of sensitive issues critical of government enforcement activities.⁹²

8. U.S. Government Activities

United States Agency for International Development. The agency undertakes no activities in Malaysia.

United States-Asia Environmental Partnership (US-AEP). US-AEP has had an active partnership program in Malaysia. U.S.-Malaysian engagement in the environmental goods and services business has also been active.

9. Other Bilateral and Multilateral Organization Activities

Prime Minister Mahatir pursues strong relations with other Islamic countries and Malaysia's Asian neighbors, promoting a "Look East" policy, which envisions Japan and South Korea as models for economic development. In addition to strong relations with other Muslim nations, Malaysia maintains strong business and government ties to the United Kingdom and the European Union generally.

ASEAN & Asia-Pacific Economic Cooperation. Malaysia is a founding member of ASEAN, established in 1967, and is active in ASEAN affairs including as chair of the ASEAN Institute of Forest Management. Malaysia has been a less active member of the Asia-Pacific Economic Cooperation.

World Bank. No activities have been conducted recently in Malaysia by the World Bank.

Asian Development Bank. In addition to support for infrastructure development and land use planning, the Asian Development Bank has supported EIA guidelines for specific types of development.

United Nations. The United Nations Development Programme has also supported EIA guideline development in Malaysia.

The *Japanese International Cooperation Agency* reports that yen loans financed 50 percent of the costs of constructing Malaysia's power generation capacity, 19 percent of highway costs, 43 percent of new railway costs, and 16 percent of cargo-handling facilities. Unlike Thailand, the Japanese International Cooperation Agency did not report financing numbers for telecommunications, waterworks, irrigation, or industrial parks, implying that they are not financially active in these sectors.⁹³

European donors. The Danish and German governments have been active in a variety of clean technology projects, including support for SIRIM's clean technology and ISO 14000 programs.

10. Opportunities to Support Clean Production and Environmental Management

Malaysia has entered a key stage in its development; it sees critical needs for incorporating environment into its industrial development program but is increasingly concerned about the costs. It aspires to the high technology, value-added industrial development of Singapore but has not adopted the strong regulatory and incentive systems Singapore has applied to achieve "clean and green" results. Demands for devolution have also complicated Malaysia's pursuit of that approach. But conditions are highly favorable in Malaysia for a policy shift to integrate environment and development.

Policy Framework

Interest in new environmental management techniques. Malaysian government, business, and academic leaders are intellectually and politically open and anxious to learn about new approaches to environmental management that come from any quarter, but they are particularly interested in engaging in regional workshops, seminars, and other activities that can draw on East Asian and Southeast Asian country

experiences with market-based incentives, environmental funds for financing environmental management, and development and application of information on economic valuation of environmental costs and benefits.

Environmental information gathering and sharing. Growing public and media attention on environment in Malaysia offers opportunities to effect change by engaging nongovernmental opinion leaders in opportunities for cleaner production and better environmental management that new information and technology offer. Although business reporting and government sharing of environmental information has been hampered by legal restrictions in Malaysia, interest in more government and business accountability for environmental management is growing. With its new legislation requiring businesses to conduct environmental audits, opportunities have increased for better ways to measure and disclose information on industrial environmental performance. The government is also placing steady pressure on improving the quality of EIAs, whereas interest in toxic release inventories is also evident.

Industrial Environmental Management

Industrial estate location, design, and management. Industrial estates number 165 and occupy 16,000 hectares; industrial growth is projected at an additional 25,490 hectares by 2000, of which 11,000 hectares are to be developed under the Seventh Malaysia Five-Year Plan.⁹⁴ Interest in technology parks by MITI is keen; several are under construction. Required EIAs can help in planning these industrial areas by focusing on clean technology opportunities, appropriate industrial combinations for cost-effective waste management, programs for toxic release inventories, and risk management approaches.

Environmental Infrastructure

Malaysia's privatization efforts provide for a government corporation to generate its own revenue. Privatization has occurred in the electricity, telecommunications, railways, and postal service sectors. After privatization, the company is listed on the local stock exchange, but the government only sells 25 percent of the company's equity. In addressing environmental infrastructure, the central government is open to privatization but relies on the private sector to initiate proposals and furnish the appropriate capital. Federalism is still a major issue between the central government and the states; each state wants to control its own domain.

Because Malaysia lacks expertise in the water supply arena, foreign investors are allowed in this area at the federal and state level. A newly established water fund, Lyonnaise Asia Water, will have \$125 million in paid-up capital to help channel equity investments into water infrastructure projects. Partners include: Australia's Lend-Lease Corporation, the United States' Allstate Insurance Company, and Malaysia's Employee Provident Fund.

Malaysia's first toxic waste treatment center was announced in 1992. The United States has an excellent opportunity to pursue business in the hazardous waste sector in Malaysia, in which \$230 million in projects are under way. Most waste is stored, and space is running out. The United States and Malaysia have a bilateral agreement to ship hazardous waste from Malaysia to countries that can reprocess and recycle it. The World Resource Center in Arizona does this for the electronics waste recycling. The U.S. Environmental Protection Agency is offering assistance to DOE to review a technical proposal for the country's first hazardous waste landfill.

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Endnotes

1. The birth rate is 27.95 births per thousand. The population growth rate is 2.24 percent. Fifty-nine percent of the population is between 15 and 64 years of age; 37 percent are under 15. The infant mortality rate is 24.7 deaths per thousand live births. Life expectancy for males and females is 66.6 and 72.6 years respectively. The literacy rate (male/female) is 78 percent (86 percent/70 percent). The labor force comprises roughly 8 million (CIA 1995).
2. Malaysia is also religiously diverse. Islam is the primary religion, although Buddhism, Hinduism, Christianity, and indigenous religions are also widely practiced. Bahasa Malaysia is the official language, even though English is the acknowledged language of business and a common language of instruction at the tertiary level. (Malaysia is a former British colony [independence gained in 1957] and a British Commonwealth country.) Mandarin and other Chinese dialects, Tamil, and tribal languages are widely spoken, especially in the island states of Sabah and Sarawak.
3. 1995 report by the Bank Negara (Cathy Fuselier, US-AEP director, Technology Cooperation [September 4, 1996]).
4. Malaysia (1995, 55).
5. Malaysia (1995, 148).
6. U.S. Department of State (1992).
7. US-AEP (1996).
8. Under Prime Minister Mahathir, Malaysia's annual economic growth has been strong. In 1995 real GDP growth was 9.5 percent. This remarkable growth has substantially reduced poverty and raised real wages. But, as a *Financial Times* survey notes, "[a]t Malaysia's current stage of development, South Korea and Taiwan were nurturing a brace of innovative high technology companies, which later broke into world markets. The titans of technology in Malaysia tend to be foreign-owned companies, which have not transferred their know-how to local partners as quickly as the government would want" ("Malaysia, Signs of Cracks in Mahathir's Edifice," *Financial Times* [June 19, 1996], 1).
9. From 11.6 percent in 1993 to 13.5 percent in 1994. The U.S. share showed a decline (Malaysia 1995, 60).
10. Vision 2020 currently guides Malaysia's ambitious development goals well into the next century. At the core of the plan are a series of infrastructure privatization projects estimated to cost \$18 billion during the next three years alone. As part of this effort, the country is pursuing some of the largest infrastructure projects in the region; it has nearly completed the world's tallest buildings—the Petronas Towers—and Asia's largest hydroelectric dam, among other massive infrastructure projects (see section 3 on government). Many of these projects are designed to be showcased at the Commonwealth Games, scheduled for Kuala Lumpur in 1998.
11. Historically, Malaysia has relied on foreign investment to finance its rapid growth. Foreign investment in the last four years has totaled more than \$17 billion. But as China, Indonesia, and Vietnam continue to expand the market, many wonder if Malaysia will receive the same levels of foreign capital. According to estimates, approved foreign investment in the electronic sector fell by 51 percent in 1995 (Clifford 1996).

Endnotes

12. It is estimated that the labor shortage contributed to a 19 percent drop in foreign investment approvals in 1995 and has caused a 20 percent increase in labor costs in 1995 alone, fueling inflation pressures. As a matter of policy, Malaysia is less interested in maintaining low-end manufacturing, because it hopes to pursue more “high-tech” industrial production along the Korean model; however, the workforce it does have is comparatively underskilled. The government has acknowledged this as a threat to future development. In the short term, it will continue to rely on migrant workers to meet labor demand. In the long term, the government plans to invest heavily in education at all levels through targeted manpower development policies that emphasize technical competency, research and development, science and mathematics, and information technology (Price Waterhouse 1996).
13. See discussion of “Investment Outlook in 1995” in *Malaysia (1995)*, 136–37.
14. These decades are displayed graphically in the front foyer of the Malaysian Industrial Development Authority.
15. See “Malaysia Sets \$216 Billion Growth Plan” in *International Herald Tribune* (May 7, 1996).
16. In addition to manufactured goods, Malaysia continues to be an important commodity producer of rubber, tin, palm oil, tropical hardwoods, cocoa, and pepper, and a producer of textiles. It also exports petroleum and liquefied natural gas.
17. Malaysia is the world’s largest exporter of tropical timber. The rain forests of Malaysia, renowned for their genetic diversity, are experiencing one of the fastest rates of deforestation in the world. Peninsular Malaysia now imports timber from East Malaysia where logging continues at a rapid pace. Up to two-thirds of Sarawak’s total forested area has been licensed for future logging. Production from Sarawak alone currently accounts for 35 percent of the world’s total raw log exports (Rainforest Information Centre of Australia 1995).
18. Haze from forest fires in Sumatra and Kalimantan and open burning in Peninsular Malaysia are among the key causes (Malaysia 1994, 12).
19. The Department of Environment has monitored river quality since the mid-1970s for pollution from palm oil and rubber manufacturing. It has been monitoring 116 major rivers under its Annual River Water Quality Monitoring Program. The numbers of both clean and dirty rivers increased in 1994 with increasingly heavy metal pollution from industrial discharges (Malaysia 1994, 18).
20. Malaysia (1994, 66).
21. The type of industrial pollution for each is outlined as follows:
 - Rubber products processing.* Issues include contaminants such as hydrogen sulfide in wastewater, odor control, and stack emissions.
 - Palm oil industries.* Anaerobic ponds are the common means of wastewater treatment. Enhanced wastewater treatment is needed near municipalities and catchment areas as well as noise control technologies, sludge treatment, air pollution (stack) control systems, and waste recycling technologies to convert fiber and trunk wastes into value-added products.
 - Oil, gas, and petrochemicals.* The main pollution problems include radioactive sludge disposal, recovery of used oils, and ship-based sludge treatment and disposal.

Electronics/electroplating. The majority of electroplating and metal-finishing industries are small- to medium-sized enterprises. Wastewater effluent with heavy metal contaminants are routinely disposed of in domestic sewage systems without prior treatment. Cost-effective wastewater systems, technology to recover heavy metals for wastewater effluent, and toxic sludge treatment and recycling technologies are needed.

Food and beverage processing. A large percentage of the country's total wastewater effluent is emitted from food processing companies. Noncompliance is a direct result of the lack of appropriate treatment technology, overutilized capacity, and poor maintenance of the treatment systems. The wastewater stream has high levels of biological oxygen demand, chemical oxygen demand, oil and grease, and suspended solids.

Other target industries include animal husbandry (swine farming), wood-based manufacturing, textile and dye mills, chemicals and chemical-based products, and semiconductor and sago processing.

This information was excerpted from US-AEP (1996).

22. Rising public, government, and business awareness of the problem is one reason. A new chemical act is expected to handle chemicals that are now unregulated. At present, no adequate toxic waste storage facility exists for multinational corporations (Hajaii Rosnani Ibrahim, deputy director, DOE, Kuala Lumpur, [June 18, 1996]). MITI states that Malaysia generated more than 417,400 metric tons of toxic and hazardous wastes in 1994 and that amounts will continue to increase (Malaysia 1995, 196).
23. Environmental Business International (1996).
24. The transition from an agriculture- and commodities-based economy to one based on manufacturing has been the deliberate design of government policies. Following racial disturbances in 1969, the government adopted a New Economic Policy to eliminate poverty and economic segregation by race. Implemented in 1970–90, the policy promoted the radical restructuring of the economy and a redistribution of capital ownership (Bumiputras to 30 percent, other Malaysians to 40 percent, and foreigners to 30 percent.) After a 1985 recession, the New Economic Policy's stated numerical goals were suspended. In 1991, however, the government renewed its commitment to economic equity in a successor policy, the National Development Policy (U.S. Department of Commerce 1993).
25. Social and economic equity is an underlying theme of Malaysia's economic success and may be one reason that Malaysia is less open to foreign investment than Hong Kong or Singapore. The government is sensitive to financial control issues and must balance the interests of ethnic Chinese, who control 60 percent of the economy, and the politically dominant Bumiputras (Clifford 1996).
26. A telling example of rising government attention to environment as a factor in Malaysia's economic growth strategy is its interest in environmental economic indicators. (See banner headline, "Environment as economic indicator," New Straits Times [November 20, 1997], 1).
27. The Government of Malaysia is a constitutional monarchy. The chief of state or "Paramount Leader" (Yang Di Pertuan Agong) is elected every five years from among the nine Malay hereditary sultans. The current Paramount Ruler is JA'AFAR ibni Abdul Rahman (1994) (surnames are capped here for the reader's reference). The Malaysian Parliament is based on the

- British Commonwealth system and consists of a Senate and House of Representatives in part named by the Paramount Ruler and in part elected from each of the thirteen states. The Cabinet is appointed by the Paramount Ruler from members of parliament and is responsible for legislative issues and headed by the prime minister. The current prime minister is Dr. MAHATHIR bin Mohamad (1981), the deputy prime minister and likely successor is Finance Minister ANWAR bin Ibrahim (1993). MAHATHIR is the country's longest serving prime minister and heads the ruling coalition, National Front, a confederation of thirteen political parties dominated by the United Malays National Organization. The Malaysian legal system is based on British common law.
28. Land tenure, municipal corporations, and other local administration issues are left with Malaysia's thirteen state assemblies. In Peninsular Malaysia, however, state law gives way if a conflict with federal law exists or if the Federal Parliament seeks to ensure uniformity in laws of two or more states (articles 76[4] and 75 respectively of the Federal Constitution; Pillai and others 1995, 12, 13).
 29. Assessment team interviews, Kuala Lumpur (June 17–21, 1996).
 30. EIA requirements have been enforced under the EIA Order since 1988. They are prepared by project proponents for projects specifically listed. Numbers of documents have increased steadily each year with a total of 843 reports received since 1988. In 1994 DOE received new EIAs on 300 projects (289 preliminary EIAs and 11 risk analyses on hazardous installations), which were up 11 percent over 1993. Of these, 23 percent were for resorts and recreational development, 17 percent for quarries, 11 percent for housing, and 10 percent for industry and infrastructure activities. Of the total, DOE rejected 30 and accepted 176, whereas 12 were dropped by proponents and the rest held for decision in 1995. Efforts to improve EIAs, endorsed by the Cabinet in 1992, include development of specific guidelines for industrial estates, resorts, and petrochemical industries. Guidelines for water and energy projects have been developed with assistance from the Asian Development Bank and for quarrying and mining by the United Nations Development Programme. DOE has been actively engaged in improving EIA quality through registration of consultants, professional training abroad (the United Kingdom), and workshops and seminars. See chapter on environmental assessment in Malaysia (1994, 44–49).
 31. Hajaii Rosnani Ibrahim, deputy director, Department of Environment, Kuala Lumpur (June 18, 1996).
 32. Representatives of the Malaysian International Chamber of Commerce, Kuala Lumpur (June 20, 1996).
 33. For example, 162 cases were brought against violators of the 1974 Environmental Quality Act in 1994, more than half filed in Malaysia's most heavily industrialized areas. The vast majority of these violations concerned water pollution (Malaysia 1994, 38).
 34. DOE's record of environmental compliance shows, for example, that the electrical and electronic sectors achieved a 90 percent compliance rate, whereas metal finishing had the lowest compliance rate of 42 percent (Malaysia 1994, 24, 25). Environmental compliance is determined on the basis of whether standards are met. Compliance by 90 percent of industry means that 90 percent of the industries were inspected. Because DOE picks high pollution stretches of rivers and looks at complaints, it essentially focuses on the "hot spots," which are also identified by states (Hajjah Hanili Ghazali, DOE representative at the Malaysian Industrial Development Authority, Kuala Lumpur [June 20, 1996]).

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37. At present, for example, if two inspectors are in a state with 800 manufacturing entities, they can do perhaps six inspections a week given the mileage and budgets available for expenses. But, even though DOE does not believe it has enough inspectors, especially to address the pollution issues of small- and medium-sized enterprises, a significant increase in its staff and budget appears unlikely. Currently, a freeze has been imposed on new civil servant hiring. The Economic Planning Unit in the Prime Minister's Office wants to shift pollution control responsibilities to the states, making DOE responsible for environmental planning. The Economic Planning Unit wants environment to be everyone's concern and to have a planning unit in every agency and every state, where all resources are controlled (Freddie Cho Chen Seng, director, and Hasnoi Zam Zam Ahmad, assistant director, Environmental Planning Unit, Prime Minister's Office, Kuala Lumpur [June 19, 1996]).
 36. The NGO Environmental Management & Research Association of Malaysia (ENSEARCH) worked with the Department of the Environment, Rubber Research Institute, and Palm Oil Research Institute to agree on pollution standards and an environmental management and enforcement program that gradually but steadily have reduced waste levels (C. K. John, executive director, and Jenny Tan, ENSEARCH, Kuala Lumpur [June 17, 1996]). In the future, DOE is expected to focus on food and beverage and electroplating industries for pollution control.
 37. SIRIM issued some 700 ISO 9000 certificates to Malaysian firms by late 1995 under its accreditation by the Malaysian Accreditation Council, which was created in 1995 under MOSTE as the government agency for accreditation (assessment team interviews in Malaysia [June 1996]).
 38. A wide range of companies have applied, including electronics, rubber, petroleum, and general manufacturing; 80 to 90 percent are multinational corporations, mostly Japanese and Malaysian companies, no Taiwanese or Korean companies, and apparently only one U.S. company (Texas Instruments) (Lu Sim Hoay, research manager, Energy and Environmental Technology Group, and Norafiza Saim, research officer, Standards and Certification Unit, SIRIM, Kuala Lumpur [June 18, 1996]).
 39. The Danes will be funding a specialist for each sector with one long-term, seven-month advisor to provide services as needed.
 40. It is an unusually comprehensive and analytical report concerned with international trade and investment trend and replete with analyses and statistics on industrial sector performance in Malaysia, including discussion of environmental requirements (see Malaysia 1995).
 41. Companies with more than a million dollars revenue must register with MITI. Those with less register with local government.
 42. Malaysia (1995, 232).
 43. The Industrial Technology Assistance Fund was launched in 1990 with a fund of M\$50 million (M\$1 equals approximately US\$0.40). According to MITI, small- and medium-sized enterprises (SMEs) must upgrade operations and produce new products to remain competitive, but "... the number of SMEs which received grants from the ITAF scheme has not been very encouraging" (Malaysia 1995, 237).
 44. Azizan Ahmad, principal assistant director, and Ruzain Idris, assistant director, Industrial Policy Division, MITI, Kuala Lumpur (June 20, 1996).

Endnotes

45. Waste generators establishing storage, treatment, or disposal facilities may receive an initial 40 percent and annual 20 percent allowance for all capital expenditures during five years. Companies directly engaged in hazardous waste management are eligible for “pioneer” status, which means taxes of only 30 percent of income (or 15 percent in specified locations) for five years (see Malaysia 1996, 16).
46. Malaysia (1996).
47. An environmental services center in MIDA includes representatives from DOE, Customs, Immigration, Human Resources, Treasury, Electricity Board, Water Board, and Department of Safety and Health. It constitutes a kind of one-stop agency that helps investors understand environmental requirements. Applications are screened and, if an EIA is needed, MIDA’s action committee on industries is alerted. If an EIA is required, an approved EIA is a condition for getting a license; otherwise no license to manufacture and no import of toxics will be allowed. If standards appear to be capable of being complied with, the application goes to the State Development Corporation for approval. After construction, DOE examines samples from the operation and, if an EIA has been prepared, a monitoring requirement is imposed. The DOE representative feels that she is listened to; the action committee on industries will not overrule her determination. She is also on the action committee, whose chairman is the head of MIDA (Hajjah Hanili Ghazali, Kuala Lumpur [June 20, 1996]).
48. Under the Fifth and Sixth Malaysian Plans, 31 institutions, including 8 universities, 6 “statutory” research institutions, and 17 governmental research institutions and departments received funding.
49. Malaysia’s stated environmental policy objectives are to maintain a clean and healthy environment, minimize the environmental impact of a growing population and human activities, balance the benefits of socioeconomic development against the need for sound environmental conditions, emphasize prevention and conservation measures to preserve the country’s unique and diverse cultural and natural heritage, incorporate environmental concerns into project planning through EIA studies, and promote greater cooperation among federal and state authorities as well as ASEAN governments (Malaysia 1995). Malaysia is party to the conventions on biodiversity, climate change, endangered species, hazardous wastes, marine life conservation, nuclear test ban, ozone layer protection, and tropical timber. Malaysia has also signed but not ratified the Law of the Sea Treaty.
50. Key environmental regulations under EQA include the “Control of Lead Concentrations in Motor Gasoline” (1985), “Sewage and Industrial Effluents” (1979), “Control of Smoke and Gas Emissions” (1977), “Clean Air” (1979), and “Schedule of Wastes for Treatment and Disposal Facilities” (1989) (see the List of Regulations and Orders Enforced Under the Environmental Quality Act (1974) by the Department of Environment, appendix B in Malaysia [1994]).
51. US-AEP (1996).
52. Air and water standards are within international guidelines and are consistent with most countries in the region; however, Malaysia’s water standards are not as stringent as neighboring Indonesia, especially for rubber and palm oil manufacturing.
53. Penalties for air, soil, inland water and noise pollution increased from M\$4,000 to M\$40,000 (M\$1 equals approximately US\$0.403) and/or jail sentences from two to five years. Oil and

waste discharge penalties increased from M\$10,000 to M\$200,000 and/or jail for five years. Passage of the new amendments occurred since the assessment team visit in June 1996; the new act has been enforced since August 1, 1996 (unclassified cable, U.S. Embassy, Malaysia [September 4, 1996]).

54. Assessment team interviews in Malaysia (June 17–21, 1996). The Environmental Quality Council meets approximately once a year. Recent policy issues deliberated by the council include (a) enforcement issues and strengthening of existing environmental legislation, (b) expansion of EIA requirements and development of special sectoral guidelines for EIA-prescribed activities, (c) privatization programs, including monitoring and surveillance programs, (d) growing environmental problems of toxic and hazardous waste, (e) Sarawak state's Natural Resources and Environment Ordinance requiring EIAs for timber, (f) policies to improve environmental awareness and public education (see chapter 1, "Environmental Quality Council" in Malaysia [1994]). (State representation on the Council consists of ministers for Sarawak and Sabah.)
55. See "List of Prescribed Activities," in appendix C of Malaysia (1994).
56. EIA report processing by DOE has been decentralized to its regional offices, so that only the states of Perlis and Kedah and the federal territories remain under DOE headquarters' control (Malaysia 1994, 44).
57. See chapter 5, "Environmental Assessment," in Malaysia (1994).
58. The decision received extensive front page coverage with a thorough explanation of the issues in *Malaysia New Straits Times* [June 19, 1996], 1).
59. Health officers at the local level are among those needing training. Some 5,000 to 6,000 from the 140 local governments need to be retrained (Freddie Cho Chen Seng, director, and Hasnoi Zam Zam Ahmad, assistant director, Economic Planning Unit, Prime Minister's Office, Kuala Lumpur [June 19, 1996]).
60. Malaysia (1994).
61. Malaysia has only 7,000 full-time research scientists or 400 per million population, compared to 6,500 for Japan, 3,200 for the United Kingdom, and 1,300 for Korea. MITI believes this low ratio has inhibited the country's ability to acquire and adapt foreign technology to its needs (Malaysia 1995, 194).
62. They are automated manufacturing technology, biotechnology, information technology, electronics and telecommunications, advanced materials, and aerospace (a new area the government has marked for promotion) (Malaysia 1995, 193).
63. The electrical and electronics industry is cited by MITI as an example of the problem. Developed by multinational corporations in the 1970s, it depends on foreign technology and development. Research and development expenditures in the private sector are below 1 percent of GDP, versus 2.7 percent in the United States, 2.9 percent in Japan, 1.9 percent in Korea, and 1.1 percent in Singapore. To foster technology transfer, Technology Transfer Agreements are the favored mechanism between local and foreign companies; these are regulated by the government to ensure protection of local companies and the national interest under the Industrial Coordination of 1975. In 1994, 128 of these were signed, down from 185 in 1993 (Malaysia 1995, 192, 193).
64. Makendya and Shibli (1995).

Endnotes

65. Economic Planning Unit and DOE, Kuala Lumpur (June 19–20, 1996).
66. See Pillai (1995, 37).
67. Augustine Koh, program coordinator (environmental and urban), National Institute for Public Administration, Government of Malaysia, Washington, D.C. (September 19, 1996).
68. See R. Pura, “Asian Infrastructure: The \$4.2 Billion Sewer,” in *Asian Wall Street Journal* (April 18, 1994).
69. By 2021, Indah Water Konsortium will have built, upgraded, operated, and maintained every existing sewage plant throughout the country. The consortium has already issued the first capital works tender for the Labuan island territory (and proposed banking center) and is preparing solicitations for Penang, Langkawi, Port Dickson, Sungei Besi, and Ipoh (Fernandez 1996).
70. Some state governments such as Johor Baru had already awarded contracts for solid waste collection and disposal at the state level creating a conflict between regional and state concessions. For example, in Selangor, a municipal landfill was being completed by the French group, Sita, but was not a part of the national plan. State authorities managed to push ahead with the project anyway, illustrating the dynamic tension between state and federal authorities.
71. The Danish-Malaysian consortium, Kualiti Alam Sdn Bhd, won the badly needed concession in 1992. Medical waste management has also been contracted as part of the overall privatization of hospital support services. The country has been divided into three regions, in each of which one consortium provides waste disposal. US-AEP has assisted two companies involved, Radicare and Faber-Medlux, in obtaining source disposal systems in the United States.
72. Various boards, committees, and councils (the Environmental Quality Council, for example), on which industry associations serve, review reports and legislative proposals.
73. Few incentives exist to encourage congregation of small- and medium-sized enterprises; although they cause most of the toxic pollution problem, they are far behind multinational corporations in environmental awareness and capabilities to respond with environmental management.
74. The Nestle Corporation, for example, with ten plants employing 4,000 people in Malaysia, expects an increase of 23 percent or more in 1997 (Federation of Malaysian Manufacturers, Kuala Lumpur [June 19, 1996]).
75. A consensus existed among interviewees that enforcement will get weaker as it goes to local and state governments, and that small- and medium-sized enterprises, although they are significant polluters, are not adequately motivated to comply with regulations. Malaysia does not encourage the import of old and dirty equipment; there is no exemption of duty for old equipment. Malaysia imports nearly all of its capital goods and most of this equipment, perhaps 95 percent, is new (Federation of Malaysian Manufacturers, Kuala Lumpur [June 19, 1996]).
76. It is clear that industry wants to control the environmental audit system required by the EQA amendments; industry wanted a voluntary audit. Now, MICCI will help organize half-day ISO 14000 road shows for chief executive officers and three-day sessions for managers in late 1996.
77. MICCI members and Sanjay Tiwari, chairman, Kuala Lumpur (June 19, 1996).
78. The American-Malaysian Chamber of Commerce has been active in Malaysia for more than two decades and is a valuable source of information for U.S. companies wishing to do business there.

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79. Nestle has 200 suppliers and has an annual meeting to acquaint them with what it expects in the way of environmental performance. Its environmental program encourages subcontractors to solve chlorofluorocarbon problems and work toward cleaner systems, but Nestle has no contract requirements on these topics. It expects these issues to be of increasing importance. Worldwide, Nestle has an environmental management system similar to ISO 14000; the company expects the ISO certification transition to be easy. During this past year in Malaysia, supplier requirements of ISO 14000 were explained to the suppliers, who responded positively. Nestle provides no technical advice but expects incorporation of environmental requirements into subcontracts. (Federation of Malaysian Manufacturers, Kuala Lumpur [June 19, 1996]).
 80. Shiela Aikanathan, executive director, Business Council for Sustainable Development, Kuala Lumpur (June 20, 1996).
 81. Wan Portiah, senior analyst, and Norahayati Mustapha, senior analyst, Institute of Strategic and International Studies of Malaysia, Kuala Lumpur (June 18, 1996).
 82. Chew Swee Leng, chief executive officer, Malaysian Iron and Steel Industry Federation, Kuala Lumpur (June 20, 1996).
 83. The Malaysian Textile Manufacturers Association has formed a pollution control technical committee to advise companies on environmental compliance. The Metal Finishing Society and Electroplating Association of Malaysia is interested in helping members adopt appropriate pollution treatment technologies.
 84. Wan Portiah, senior analyst, and Norahayati Mustapha, senior analyst, Institute of Strategic and International Studies of Malaysia, Kuala Lumpur (June 18, 1996).
 85. Staff of the Institute for Environment and Development, Kuala Lumpur (June 21, 1996).
 86. At least two of these, The University of Technology and the University of Malaysia at Sarawak offer post-graduate degrees in environmental sciences. Sarawak offers a doctorate and lists the research areas for which funding is available in: sago research, including bioconversion of sago pith residue to useful products; the screening and bioassay of active compounds from local plants; study of endangered flora and fauna of Borneo; remote sensing and GIS for plant and wildlife resource management; physiochemical study of Sarawak riverine and coastal environments; and characterization of industrialization effluents and process parameters.
 87. Historically, foreign banks operating in Malaysia have been heavily regulated by Bank Negara. These regulations have restricted growth and limited foreign banks' ability to compete with domestic Malaysian banks. Bank Negara also requires multinational corporations to obtain at least 60 percent of their credit requirements from domestic banks. Bank Negara also requires foreign banks to incorporate locally and divest part of their equity.
 88. Sakura Merchant Bank and the Arab-Malaysian Merchant Bank recently financed a M\$500 million waterworks project in Selangor.
 89. U.S. Department of Commerce (1993).
 90. The upper primary grades have used an environmental education curriculum since the 1980s. Also, to enlist public support and build consumer pressure on polluters, DOE publishes the names of polluters in the newspapers (Schaper 1996)

Endnotes

91. In one case that received international attention, the Consumers' Association of Penang represented the community of Bukit Merah, which was affected by radioactive wastes from an earth-processing plant co-owned by Mitsubishi Chemicals. The association initially won the case in the lower courts, although it lost in Malaysia's Supreme Court. The joint venture did close down operations as a result of local and international pressures. The Consumers' Association of Penang is currently representing communities threatened by the proposed *Bakun Dam* in Sarawak among other activities.
92. See "Logging Companies Ignoring Law on EIA" (September 29 1993), "States Logging List Vital to Nab Culprits" (September 30, 1993), "Penan Fund Rip-Off" (November 1, 1993), "Government Probe Into Groups Involved in Penan Rip-Off" (November 2, 1993), "Loggers Get Six Months to Prepare EIA Reports" (July 12 1995), all in *New Straits Times*.
93. Recent development projects initiated by the Japanese International Cooperation Agency include the Sabah Reforestation Technical Development and Training Project, Effective Wood Utilization Research Project in Sarawak, and Evaluation and Analysis of Hazardous Chemical Substances and their Biological Treatments.
94. Malaysia (1995, 200).

country
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UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



Philippines

By John Butler

The Republic of the Philippines consists of 7,107 islands stretching between the Pacific Ocean and the South China Sea with a land size roughly equal to the state of Arizona. Although the economy stagnated during the 1980s and early 1990s, Government of the Philippines (GOP) economic liberalization policies appear to be turning the economy around in recent years. Unfortunately, this development has come at a heavy environmental cost. The GOP has initiated environmental policies to address degradation stemming from economic growth largely based on a “command and control” approach. Environmental compliance among industries, however, is low; current private and public industrial policies are not currently focused on environmental concerns. Public information on environmental quality and industrial environmental performance is seriously lacking, although the GOP is launching a new and potentially important initiative to address this problem.

1. Economic Profile

Demographic Conditions and Trends

The Philippines’ population reached 73.3 million in 1995. The population growth rate has decreased from an average annual rate of 3.0 percent in 1970 and 2.7 percent in 1980 to the current rate of 2.4 percent. More than half the population lives in urban areas, up from roughly one-third in 1993. With a basic literacy rate of 95 percent, the Philippines is ranked among countries in the world with high literacy achievement.¹

Economic Conditions and Trends

After ten years of stagnation—real annual per capita income in 1993 was lower than in 1977—the Philippine economy started a significant upward trajectory in 1993. An increased rate of investment and continued capital inflows from abroad have begun to signal strengthened confidence in the private sector. Chronic power shortages, which had been prevalent prior to 1993, were overcome, at least in the near term.² Real gross national product grew by 2.8 percent in 1993, 5.3 percent in 1994, and 5.7 percent in 1995, whereas the average inflation rate was 8.2 percent during this period. The industry and service sectors led this growth (although the electric and gas utility subsector was the major growth leader, the manufacturing subsector saw significant growth with gross domestic product increases of 6.9 percent in 1995 and 5.0 percent in 1994).³

Total exports in 1995 totaled \$17.4 billion,* an increase of nearly 29 percent during 1994. The largest markets for Philippine export products were (as they have historically been) the United States (35.3 percent) and Japan (15.8 percent).⁴

* Unless otherwise indicated, all dollar amounts indicate U.S. dollars.

acronyms

ASEAN	Association of Southeast Asian Nations
BOI	Board of Investments
BOT	Build-own-transfer
BPS	Philippine Bureau of Product Standards
DENR	Department of Environment
DTI	Department of Trade and Industry
EIS	Environmental impact statement
ENRA	Environment and natural resource accounting
ENRAP	Environment and Natural Resource Accounting Project
EO	Executive Order
GOP	Government of the Philippines
ISO	International Organization for Standardization
LGU	Local government unit
LLDA	Laguna Lake Development Authority
MWSS	Metropolitan Waterworks and Sewerage System
NEDA	National Economic Development Authority
PD	Presidential Decree
RA	Republic Act

2. Environmental Profile

Industrial and Environmental Development Background

A substantial amount of private sector economic activity is accounted for by a relatively small number of firms. According to the 1988 census, although more than 9,100 manufacturing establishments existed in the Philippines, fewer than 10 percent of these employed more than 200 people. Yet, these firms accounted for 64 percent of total manufacturing employment and 77 percent of manufacturing value added. In the general business sector, the top fifty corporations accounted for around one-fifth of gross domestic product.⁵

The Philippines' industrial sector primarily comprises agro-based industries (sugar and coconut mills) and resource-extraction industries (mining and mineral processing, and cement plants). Light manufacturing (textile mills, garment factories, and consumer products, including electronics), chemical plants, and some heavy industries (steel mills, copper smelters, and phosphatic fertilizer plants) constitute the rest of the industrial sector. More than two-thirds of the country's industrial facilities are located in Metro Manila.⁶

Environmental Conditions

Air and water quality—monitoring data are extremely limited. Air quality data for the Metro Manila area indicate that suspended particulate matter and lead exceed World Health Organization guidelines by substantial margins (in fact, Metro Manila's air has been called "among the most polluted in the world"). The suspended particulate matter problem is attributed largely to stationary sources and transportation, whereas transportation is clearly the major source of lead emissions.⁷

Almost half of all water quality—monitoring stations show pollutants in excess of the worst official Philippine classification of water bodies. The major water quality problem identified by the World Bank is low dissolved oxygen levels due to untreated discharges of domestic sewage and industrial organic wastes.⁸ All four major river systems in Metro Manila are biologically dead.⁹

Most industrial effluent in the Philippines goes untreated or only partially treated and is discharged into inland and marine waterways. The largest polluting industries by volume of effluent are those for coconut and vegetable oil, sugar milling, distilleries, textiles, iron and steel, mining, and cement. The most toxic polluters are smelters, petroleum refineries, petrochemical industries, pesticide/wood preservative industries, gold amalgam processors, industrial chemical industries, and fertilizer plants.¹⁰

Groundwater extraction for industrial processes and public water supply is a growing concern in Metro Manila. Although groundwater quality has not been monitored on a regular and consistent basis, salinity profiles have shown evidence of saltwater intrusion.¹¹

Environmental Trends

Although data on environmental quality are sorely lacking, GOP monitoring activity is gradually increasing: 185 air quality—monitoring stations are in place; water quality data were collected from more than 400 water quality—monitoring stations on 146 water bodies in 1995.¹² A system is not in place, however, to evaluate these data systematically and use them for program planning and priority-setting purposes.

The need for an integrated approach to watershed management is increasingly recognized in the Philippines; however, although serious discussions are taking place within the GOP about adopting comprehensive watershed management programs and policies, currently no national-level body exists to plan, coordinate, and monitor such an approach.¹³

3. Government

Key Agencies for Industrial and Environmental Matters

The *Department of Trade and Industry* (DTI) is the leading GOP agency for development and implementation of industrial development policy. The department is organized around three major groups: industry and investment, international trade, and consumer welfare. The most important organizations within DTI with respect to environmental matters include the following:

- The *Board of Investments* (BOI) promotes and provides incentives to producers and traders of nontraditional export products and enterprises that render services paid in foreign currency. BOI plays a key role in organizing trade missions.
- The *Philippines Bureau of Product Standards* (BPS) oversees certification for ISO (International Organization for Standardization) 9000 and 14000. The majority of ISO 9000 certifications (about 190 companies to date) have been conducted by private foreign certification companies, although BPS also performs certification. Although BPS is likely to have lead responsibility for ISO 14000, the Department of Environment and Natural Resources and Industrial Technology and Development Institute (both described below) will play major roles as well. DENR, although it has expressed an interest in working with BPS to oversee certification for ISO 14000, has too few resources to allow it direct involvement and will probably only participate in the multisectoral committee.¹⁴

The *Department of Environment and Natural Resources* (DENR) is the agency primarily responsible for protecting and enhancing environmental quality. Industrial environmental matters are within the purview of the Pollution Adjudication Board and the Environmental Management Bureau (see below). DENR is represented in the fourteen administrative regions of the Philippines by its regional offices. At the provincial and community levels are the Provincial Environment and Natural Resources Office and the Community Environment and Natural Resources Office, which are the implementation arms of DENR in provinces, cities, and municipalities.¹⁵

- The *Environmental Management Bureau* deals with the “brown side” of DENR; the bureau formulates environmental quality and discharge standards as well as standards for management of solid and hazardous wastes and toxic and hazardous substances. The bureau also provides technical assistance to the secretary and regional officers in implementing environmental and pollution laws.
- The *Pollution Adjudication Board* sets fines for noncompliance with regulations regarding air and water pollution and issues notices of plant closures due to noncompliance with pollution control measures and regulations. The board is authorized to (a) issue cease-and-desist orders to compel compliance with environmental regulations, (b) require the discontinuance of pollution, and (c) serve as arbitrator for determining damages and losses resulting from pollution.

The *Department of Health* works to protect and monitor public health as it is affected by air and water pollution and quality and oversees the management of hospital wastes.

The *Department of Public Works and Highways* is responsible for traffic management, emissions control, maintenance of drainage systems for water and wastewater, and construction of sanitary landfills in Metro Manila.

The *National Economic Development Authority* formulates and supervises implementation of economic development plans at both the national and sectoral levels. These plans already integrate the concept of sustainable development. Within the National Economic Development Authority, the *Philippines Council for Sustainable Development*, chaired by the authority's chairman, coordinates development policies regarding sustainable development. The council reviews all major investment projects and provides input in decisions primarily through the environmental impact statement (EIS) process. The council is also formulating the Philippines Agenda 21 for sustainable development. The Philippines Council for Sustainable Development is a partnership between the government and the public but does not include businesses as direct members.¹⁶

The *Department of Science and Technology* is the premier science and technology body in the country and is charged with the twin mandates of providing central direction, leadership, and coordination for all scientific and technological activities as well as formulating policies, programs, and projects to support national development.

- The *Industrial Technology and Development Institute* is largely responsible for the technology development and technology transfer activities of the Department of Science and Technology. The institute is the leading government agency for testing and metrology and manages the Philippine Laboratory Accreditation System. The institute also manages most of the GOP's industry research institutes, except for private sector research institutes in the Philippines for textiles, metals, and forest products. The Pollution Control Division maintains information on environmental technologies (primarily end-of-pipe) and performs industry waste audits on request.¹⁷

The *Department of Energy*, created in 1992, is required to submit a long-term national energy program to Congress every year, outlining the energy requirements of the Philippines regarding achievable physical infrastructure and energy self-sufficiency targets.¹⁸

Other Key Institutions for Industrial and Environmental Matters

The *Laguna Lake Development Authority* (LLDA) is a public corporation created in 1983 to manage and control the resources of the Laguna de Bay, a 90,000-hectare lake near Metro Manila. LLDA has permitting and enforcement authority, issues and monitors compliance with standards for industrial and municipal dischargers, and issues cessation orders. LLDA has nearly 1,200 industrial establishments under its jurisdiction, of which 34 percent use water for processes.¹⁹

The *Metropolitan Waterworks and Sewerage System* (MWSS) is a public corporation with jurisdiction over all waterworks and sewerage systems in Metro Manila and surrounding municipalities. To privatize the system, the International Finance Corporation has agreed to supervise the Philippines' sale of MWSS and will design an operating and investment plan as well as oversee competitive bidding.²⁰

The *Local Water Utilities Administration* is responsible for providing water supply and financial and technical assistance to local water districts outside the jurisdiction of MWSS.

Local Government Units (LGUs) are empowered to implement measures that will sustain the ecological balance within their jurisdictions, enforce laws and regulations on the environment, and enact ordinances to protect the environment and impose penalties for infractions. Under the Pollution Control Law, LGUs may impose higher standards for pollution control and mitigation than those provided by DENR, subject to DENR's approval.

4. Policies and Laws

The GOP has pursued a policy of deregulation, import liberalization, and tariff reduction, focused on lifting quantitative import restrictions and replacing them with tariffs. Environmental quality, to the extent that it is considered in industrial and macroeconomic policies, is generally perceived as a cost and externality.²¹ Environmental policy is based primarily on a traditional "command and control" approach, but industrial compliance with environmental regulations is extremely weak due to the GOP's historically weak enforcement regime. Industrial policy does not for the most part incorporate environmental concerns; the government programs intended to support the Philippines' growing industrial base have only recently begun to provide technical assistance on environmental matters. Recently, however, the central government has shown encouraging signs that it may be willing to take some bold steps to reshape its existing policies and programs.

Environmental Policies and Laws

An extensive body of legislation and regulations related to environmental and natural resource management exists in the Philippines. The regulatory framework created by those laws and regulations is complex, because the laws and regulations remain in place decades after promulgation, even though the circumstances have changed.²²

The country's current environmental regulatory framework has two aspects: (a) EISs and environmental compliance certificates and (b) standards and regulations implemented through a permit system. Previously the GOP provided a tax incentive for purchase and installation of pollution controls; however, because this incentive expired in 1984 and has never been renewed, market-based instruments are not part of the government's environmental policy portfolio.

The government's current approach to industrial environmental management has serious deficiencies that are recognized by the World Bank and DENR itself. Although the command and control approach is greatly relied on, industrial compliance with applicable standards is extremely low and monitoring is not widespread. Even for many firms that have installed pollution controls, proper operation and maintenance has not been implemented. Furthermore, the EIS process is complex and burdensome, including a two-step approval process (i.e., a requirement for both approval to construct and approval to operate).²³

Unlike DENR, which is hampered by legal limitations and burdensome administrative requirements, LLDA has more flexibility and autonomy. LLDA is currently establishing a new framework of water discharge permits, effluent charges, and monitoring requirements, which it plans to implement in the next year.²⁴

The GOP developed the *Philippine Strategy for Sustainable Development* in 1989, in which it included eleven strategies and priority projects. The strategy, which is the major element of the *Philippine National Environmental Action Plan*,²⁵ ratified in 1990, features the Residual Management System, which attempts to take a more comprehensive approach to pollution mitigation within a sustainable development framework.

The Pasig River Rehabilitation Program is a fifteen-year multisectoral high priority program led by the GOP to bring ecological health back to the biologically dead Pasig River, which stretches from Manila Bay through the heart of Manila to Laguna Lake. An important strategy for the river's rehabilitation is to control pollutants from the more than 2,000 industries that discharge into it. To that end, DENR and LLDA are developing a data base that will identify and characterize these industries.²⁶

The *Clean Air 2000 Program* was created by the GOP to try to mitigate growing vehicular air pollution in Metro Manila. The program includes a public awareness campaign promoting unleaded gasoline and apprehension of "smoke belchers."

Industrial Policies and Laws

The industrial development environment in the Philippines has largely been shaped by the GOP's drive for economic liberalization, which has been greatly accelerated in recent years. The Ramos Administration has made attracting greater foreign investment a top priority. The most important action in this area has been relaxing restrictions on foreign investment and allowing full foreign equity in all but a few sectors that remain on BOI's "negative list."

DTI, through BOI, administers a system of incentives to encourage industrial investment; however, these incentives do not consider environmental concerns (and, as pointed out above, the one incentive previously in place to encourage imports of pollution controls expired long ago and was never renewed).

Responsibility for ISO 14000 rests with BPS. Although its program is still in its infancy and the Philippine private sector has not shown great interest in ISO 14000, the bureau recognizes the importance of ISO 14000 and plans to promote it aggressively.²⁷

The Industrial Technology and Development Institute provides technical assistance to Philippine industry in conducting waste audits and providing information on environmental technologies. Although the technology effort is currently directed almost solely toward end-of-pipe solutions, the institute has a great interest in moving its activity up the production stream.²⁸

In summary, the central government's industrial development and research agencies are not currently engaged in clean technology efforts but are beginning to recognize the importance of the environment as a factor of competitiveness in the global marketplace. A number of recent promising developments in this regard are discussed below.

Public Information Policies and Laws

Industrial reporting to DENR on air, water, and waste discharges is poor. Further, the limited information that is available is not in a form that is readily accessible to or usable by the public and nongovernmental organizations (NGOs) for meaningfully addressing industrial environmental problems.

Some limited efforts have been made to use reputational incentives to promote improved industrial environmental performance. DENR, through its regional offices, has worked cooperatively with NGOs in developing a rudimentary ranking of companies with poor performance (called the “Poison Award”). DENR has listed companies in the past as members of the “Dirty Dozen”; however, much of DENR’s public outreach activities with respect to “brown” issues are being devolved to LGUs.

One encouraging sign in this regard is DENR’s recent announcement of its intention to initiate a business performance rating system (see below). This system—evidence of the department’s recognition of the importance of public opinion as a policy tool for fostering improved industrial environmental management—may signal the department’s willingness to address its current serious informational deficiencies.

Legal and Policy Developments of Particular Relevance to Industrial and Urban Environmental Management

Several emerging developments in industrial and environmental policy are of particular interest to US-AEP:

- The Secretary of DENR is championing the idea of integrating environmental concerns into industrial policy. This includes a greater sharing of responsibilities within the government (e.g., with DTI and LGUs) and outside government (e.g., with industry associations). Some of the major initiatives under consideration include²⁹:
 - Moving the EIS process toward a programmatic orientation instead of the current facility-by-facility approach (e.g., streamlining EISs to a programmatic or sectoral level, such as EISs for ecological zones or industrial estates; updating and strengthening monitoring guidelines; and including pollution management audits and consideration of technology choice as an integral component of EISs).³⁰
 - Developing a balanced mix of environmental policies, including market-based instruments (see below) and streamlining components of the current command and control system (e.g., reduced penalties for prompt correction of violations).
 - Giving greater priority to pollution prevention (e.g., providing technical assistance to industry to reduce pollution loads while increasing efficiency and competitiveness).
 - Using the power of public opinion by making more information publicly available (e.g., business performance ratings, as discussed above; incentives for industry disclosure; and publishing of trends in ambient environmental quality).
 - Use of third-party certification as an alternative regulatory track for some industrial firms (e.g., for those that are ISO 14000 certified).

- The World Bank is assisting DENR in implementing two of the initiatives described above. Beginning in October 1996, a bank consultant will work within DENR to assist the department in planning and implementing a business performance rating system, along the lines of Indonesia's PROPER system, to rank companies according to their environmental performance and to announce the rating results publicly. The consultant will also work with DENR in planning and implementing an effluent charge scheme for industries discharging to Laguna Lake, to be administered by LLDA.³¹
- DTI has recently reconstituted its environmental committee and elevated it to report directly to the undersecretary and chairman of BOI. The department is reconsidering its policy regarding importation of used industrial equipment, such as possibly initiating a policy in which BOI would require further justification for adopting older, inefficient equipment and adopting economic incentives for investments in clean technologies.³²
- Although the GOP has made no concerted effort to encourage companies to participate in ISO 9000 and 14000, BPS, which has the lead role in ISO 9000 accreditation and certification, conducts monthly ISO Awareness Seminars for small- and medium-sized firms. BPS is interested in expanding the scope of these seminars to include ISO 14000.³³
- Industrial estates are a particularly important component of the GOP's industrial development strategy.
- A potentially important near-term development is the release of the Philippine program for implementing its sustainable development policy, *Philippines Agenda 21*.³⁴ One of its likely recommendations is promotion of shared and negotiated environmental standards.

5. Urban Environment and Infrastructure³⁵

Increasing urbanization in the Philippines has been characterized by the dominance of Metro Manila; however, although the lion's share of existing industry is located in Metro Manila, an increasing trend is to invest more heavily in development zones and industrial estates outside of the National Capital Region. This is evidenced by the dramatic industrialization of the CALABARZON (an area consisting of five provinces south of Manila). All industrial estates are expanding quickly; although most operating estates are in Metro Manila, the government's development policies are directed to siting the majority of new industrial estates in other provinces.³⁶

The GOP has a keen appreciation for the need for private financing for urban infrastructure and has been active in promoting and supporting infrastructure projects under private sector arrangements. The Philippines' Build-Own-Transfer (BOT) Law was amended in 1995 to expand the areas allowed for BOT enterprises and to provide for unsolicited proposals under certain circumstances. Furthermore, the National Water Crisis Act of 1995 (Republic Act 8041) was passed to address problems of supply disruption, finance, privatization, conservation of watersheds, and waste and pilferage of water.³⁷

The following summarizes the status of development of Philippine environmental infrastructure:

Water Supply

Only 62 percent of households in Metro Manila have access to potable water. Sixty-seven to 70 percent of the rest of the population has access to potable water. Lack of sewerage service for 90 percent of Metro Manila is a major contributor to the region's water pollution problem.³⁸ Cebu, the Philippines' second largest city, has the worst water supply problem.

Wastewater

Less than 10 percent of the population of the six cities and thirty-one municipalities in Metro Manila have sewerage connections, whereas not a single municipality discharging to Laguna Lake has a sewage system.³⁹ The International Finance Corporation will design and implement an investment plan and oversee competitive bidding for privatization of MWSS, which provides services to 10 million residents in five of Metro Manila's cities and towns. MWSS is conducting the Metro Manila Sewage and Sanitation Metro Plan, which consists of five construction phases extending to 2007.

Solid Waste

Most solid waste generated in the Philippines is openly dumped, some is disposed of in landfills, and only a small amount is incinerated because of the high cost. Metro Manila currently generates 11,135 tons of solid waste per day (industrial, domestic, commercial, and other sources). Of an estimated 5,500 tons of domestic solid waste per day, about 15 percent or 817 tons end up on river banks and in bays, vacant lots, storm drains, and streets. Of an estimated 4.6 tons per day of hospital waste, 92 percent is being disposed of together with residential waste. Four open dump sites exist in Metro Manila; two sanitary landfills are used outside the metropolis. The two landfills reportedly may not operate longer than six more months due to lack of budget.

To address this critical problem, Secretary Ramos of DENR has set a goal of developing one solid waste management project in each region of the Philippines. BOT projects have been announced in Metro Manila; additional development opportunities exist in Cebu, Iligan, Cagayan De Oro, and General Santos.

Hazardous Waste

The lack of any central hazardous waste treatment, storage, and disposal facilities has been a critical obstacle to implementing DENR's hazardous waste regulations under Republic Act 6969. DENR is interested in pursuing a BOT-financed facility in the Metro Manila area; several private consulting firms are engaged in hazardous waste guideline and feasibility studies.

6. Private Sector and Academia

Industry

At present, no visible industrywide thrust exists for clean technology and environmental management generally or for ISO 14000 specifically. On the positive side, it is important to note that the Philippines has

more environmental professionals in active practice than a number of its neighbors, including Singapore. One way of reaching this base of professionals is by tapping into the numerous industry associations in the Philippines, for example:

The *Philippine Quality Production Movement*, a parastatal organization that includes major corporations as members, has been an active partner with BPS in publicizing ISO 9000 and is expected to continue this relationship for ISO 14000.⁴⁰

The *Pollution Control Association of the Philippines*, consisting of pollution control officers of Philippine companies, currently has more than 3,000 members.

The *Philippines Environmental Industry Association* brings together companies and individual environmental professionals practicing in the Philippines. The association is linked to similar environmental industry associations in other countries, such as the international Environmental Industry Association.

The *Philippines Chamber of Commerce and Industries* has more than 18,000 members.

In terms of technology transfer, the Philippines has a good model of industrial extension. *MERALCO*, the Philippines electric power distribution company, is aggressively pursuing a customer-oriented energy and environmental outreach program to its commercial and industrial customers. Energy and environmental technology centers are an important part of MERALCO's strategy.⁴¹

Academic and Research Institutions

The *Asian Institute of Management* has strong ties to and recognition of the academic community. The institute is initiating a program on industrial environmental management. Given its stature, this program has the potential for major impact throughout the industrial sector.

Universities have not generally focused on industrial environmental concerns, although university research on water pollution has provided much of the water quality data that currently exists in the Philippines. University-level environmental curricula in the Philippines are new but growing (e.g., UP Los Banos has recently established a simulation modeling program). Most environmental science programs are at the B.S. degree level.⁴²

Financial Institutions

The banking community has given a strong vote of confidence in the Philippine infrastructure privatization effort. In addition, a small movement is growing within the financial community for greater concern regarding the environmental implications of project financing, as illustrated by the following examples:

The *Land Bank of the Philippines* has established the first environmental unit in the entire Philippine banking industry. A major incentive for establishing the unit was the Land Bank's participation in the World Bank's Second Rural Finance Project.⁴³

The *Bangko Sentral Ng Pilipinas* (The Central Bank), established in 1994 as a key effort by the GOP to reform central banking, can initiate fiscal policies on interest rates and favorable terms and conditions for financing of capital-intensive pollution control projects.

The *Development Bank of the Philippines* has established an environmental unit and has recently launched a policy-based lending program to support investments in projects that reduce industrial pollution and improve industrial efficiency. This program, the Environmental Infrastructure Support Credit Program, is open to manufacturing and service industries and provides financing for pollution controls and environmental management systems. The bank plans to monitor the progress of this program with both quantitative measures (reduction in pollution and solid waste and improved process efficiency) and qualitative measures (enhanced pollution abatement and industrial efficiency and compliance).⁴⁴

7. Environmental Awareness and Public Involvement

General Public Awareness of Environmental Issues

The U.S. Information Agency reported in 1992 that:

. . . most Filipinos are worried about the economy; few see the environment as their countries' most important problem; however, nearly all are personally concerned about the environment, and large majorities see negative health effects from environmental pollution, both now and in the future. A large majority believe the Philippines has serious environmental problems, and they most often identify 'loss of natural resources' as their country's most important environmental issue. . . . The public is well aware of such local problems as inadequate sewage, sanitation, and garbage disposal; water pollution; and overcrowding.

Furthermore, many Filipinos see a proactive role for both government and individual citizens in protecting the environment.⁴⁵

LLDA has recently launched a river rehabilitation program for the rivers that feed Laguna Lake. The program includes a major public outreach/involvement effort designed to mobilize citizens and communities, including sampling water quality and participating in the development of watershed management plans and river cleanup programs.⁴⁶

Public and Nongovernmental Organization Participation in Environmental Matters

Awareness of and support for the growth of NGOs is increasing, because they are viewed as vehicles for effective and increased information flow in supporting pollution abatement, resource conservation, and environmental protection. In recent years, a number of NGO leaders have obtained key government positions; NGOs have experienced an elevation in stature by government agencies. The majority of NGOs are "green" oriented, but a number of organizations have historically been active in urban environmental issues.⁴⁷

The most common vehicle for NGO participation in "brown" issues is through the EIS process. Furthermore, a decision of the Philippine Supreme Court in 1993 affirmed the right of citizens to institute a legal action against the government for violating citizens' rights to a balanced and healthful environment.

Some of the key NGOs in the area of industrial and urban environmental management are described below. This list is not intended to be all-inclusive but only to illustrate the range of NGOs, including business-oriented groups, professional associations, and advocacy organizations:

Philippine Businesses for the Environment has opened a channel for public/private partnerships for improved industrial environmental management. Formed initially in response to the United Nations Conference on Environment and Development's Agenda 21, the organization's major mission is to "mainstream" environmental concerns into business management practices. Philippine Businesses for the Environment has the lead role in coordinating the Philippine Business Agenda 21, the Philippine business community's strategy for implementing Agenda 21.

The Water Environmental Association of the Philippines, launched in September 1995 with the assistance of US-AEP and the Water Environment Federation, provides a forum for environmental professionals to network with their counterparts in the Philippines and abroad. Currently, the majority of members are from the business community, but the organization hopes to expand its membership to include more government, NGO, and trade groups.

The *Aboitiz Foundation*, headquartered in Metropolitan Cebu, has a program called the Eco-System Program, which strives to organize communities to become active in campaigning for better provision of potable water, the proper disposal of water, and better sanitation services.

Tanggol Kalikisan is the environmental defense law office of the Haribon Foundation, founded in 1987. The office intends to popularize recourse to environmental law for increased environmental protection.

The *Center for Investigative Journalism* exposed Shemberg, the Philippines' largest seaweed firm, for attempting to farm seaweed in the country's only national marine park.

8. U.S. Government Activities

The U.S. Agency for International Development (USAID), with the presence of its mission and US-AEP field headquarters in Manila, has extraordinary contact with industrial and environmental institutions in the Philippines. Recent activities relevant to industrial environmental management and environmental infrastructure include the following:

- *Industrial Environmental Management Project*. This project, which ends in spring 1997, has three components: (a) pollution prevention, (b) capacity building, and (c) policy studies and public/private dialogue. The project has largely focused on ten industry subsectors in which 130 pollution management appraisals (audits) have been conducted. The project is

currently conducting a study to assist DENR in formulating a management plan for toxic and hazardous waste substances and in drafting implementation rules and regulations for Republic Act 6969, including compilation of a list of chemicals to be regulated as hazardous. The USAID mission is currently developing plans for future industrial environmental management support to the Philippines.

- *BOT II*. This project will focus exclusively on municipal environmental infrastructure. BOT II will work with eight to ten municipalities.⁴⁸
- *Studies on Water and Wastewater Infrastructure Financing*. During the last three years, USAID has provided \$10 million in technical assistance to finance studies on water and wastewater infrastructure financing in the Philippines and policy options for facilitating private sector participation in the solid waste management sector, among others.
- The *Environment and Natural Resources Accounting Project* is a major Philippine effort to modify the conventional national economic accounting system to account better for interactions between the economy and the natural environment. The project is about to enter phase IV.⁴⁹

US-AEP Activities in the Philippines

US-AEP has supported 53 environmental exchanges, processed 267 trade leads, and sponsored 40 technology grants through the National Association of State Development Agencies, in addition to an environmental technology initiative through the Council of State Governments. With the U.S. Environmental Protection Agency, US-AEP has supported environmental action teams and short-term technical assistance.

9. Other Bilateral and Multilateral Organization Activities

European Union

The European Union gave the GOP a grant to conduct a two-year Metro Manila Toxic and Hazardous Waste Study to establish the policy framework and identify appropriate sites and treatment and disposal options for toxic and hazardous waste.

Japan

Water Control Treatment Facility. Sponsored by the Japanese Grant Facility, the project cost is 7.4 million yen. The project's areas of concern are water control treatment facilities and an information education council.

Japan Green Aid Plan, supported by Japan's Ministry of Industry, Trade, and Investment, is intended to promote industrial energy efficiency. The cost is \$20 million.

Germany

Industrial Pollution Control, Cebu. At a cost of \$5.1 million, the project is addressing toxic and hazardous waste (Republic Act 6969) implementation by DENR and LGUs.

Other Countries

The *Canadian International Development Agency* is providing institution-strengthening and capacity-building assistance to DENR. Denmark has provided funding for the Pasig River Rehabilitation Project.

World Bank

The *Metropolitan Environmental Improvement Project* has provided a wide range of policy and institutional capacity-building support to DENR and LLDA for the Metro Manila area.

Brown Fund. The objective of the fund is to support community-based approaches to waste management. A request for proposals has been issued.

Institution strengthening of DENR. The World Bank and DENR have jointly designed a strategy to address industrial pollution, focusing on (a) strengthening monitoring and enforcement, possibly through establishment of a self-financed Environmental Management Corporation, (b) creating financial incentives by introducing a pollution charge scheme, (c) offering soft loans for pollution abatement investments, and (d) facilitating technology transfer activities such as training and plant-level advisory services.⁵⁰

Water Resources Development Project. Implemented by the National Irrigation Administration (in Quezon City, the Philippines), DENR, Department of Agriculture, and the National Water Resources Board, this project intends to encourage formulation by the GOP of a national water resource management strategy, including adoption of a watershed management approach.⁵¹

Manila Second Sewerage Project. This project intends to help the GOP improve the quality of sanitation services and to encourage MWSS to expand its septage management program radically.⁵²

Industrial Efficiency and Pollution Control (World Bank and U.S. Trade and Development Agency). The project is intended to reduce pollution, minimize waste, and promote clean technology.

Asian Development Bank⁵³

Evaluation of Environmental Standards for Selected Industry Subsectors. The project will assist the Environmental Management Bureau of DENR in developing environmental standards and regulations that can be more realistically enforced, identify incentives for introducing clean technologies, and evaluate the involvement of the private sector and NGOs in laboratory analysis and monitoring of violators.

MWSS support. In recent years, the Asian Development Bank has provided technical assistance to MWSS to strengthen its operations, reduce nonrevenue water, and plan for privatization. A \$75 million loan is planned for 1997 to improve the MWSS water supply system. Another loan that is focused on the northeastern section of Manila is scheduled for 1999.

Global Environment Facility

Begun in 1994, the project is concerned with curbing the use of ozone-depleting substances in industry and promoting clean energy and clean industry.

10. Opportunities to Support Clean Production and Environmental Management

Policy Framework

Development policy. The newly elevated Environment Committee within DTI may offer a major venue for top-level department management to promote policies and programs that integrate industrial goals and environmental concerns. DENR's expressed intent to devolve environmental functions to DTI makes this committee even more important.

Pollution intensity. Under the USAID mission's Industrial Environmental Management Program (IEMP), pollution load factors (water effluent per unit of production) are being developed for seven industry subsectors, based on facility audits. This work could potentially be a starting point for promotion of a policy of using pollution intensity as a distinct criterion in the Philippines industrial development policy.

Business performance rating. DENR's plans to launch a business performance rating system could provide a potent force for improved industrial environmental performance. The department faces a plethora of obstacles in implementing such a program, not the least of which is the inexperience of DENR in working with the industrial sector—75 to 80 percent of the department's staff have a "green" or "blue" background. This fact, combined with critical gaps in monitoring data and reporting systems, could undermine this promising initiative. Although the World Bank is currently assisting DENR in addressing these obstacles, additional support may be required, such as supporting exchanges between the Philippines and other countries that have implemented rating systems (e.g., Indonesia and Taiwan).

Effluent charges. LLDA's plans to implement an effluent charge scheme later this year is fraught with implementation problems, particularly given the fact that existing monitoring and reporting systems require substantial improvement. If LLDA can overcome these problems, taking advantage of donor assistance such as that currently being provided by the World Bank, this scheme could provide a laboratory to promote the concept throughout the Philippines.

Environmental impact assessment. DENR's current review of the EIS and permit renewal process offers a major opportunity for government policy to positively affect the Philippine's industrial technology base and siting selection, especially because the department is considering integrating pollution management audit requirements into the EIS, upgrading monitoring guidelines, and (possibly) including technology choice as a discrete project evaluation factor.

National environmental accounting. The environmental accounting system implemented by the National Economic Development Authority could provide a powerful model for other countries in the region as a demonstrated tool for integrating environmental costs and benefits into industrial and economic development policies. Donors should explore with the Government of the Philippines possible opportunities for sharing the Philippine experience throughout the region.

Strengthening scientific base of NGOs. NGOs in the Philippines need a stronger scientific/technical capability to address "brown" environmental issues (e.g., clean technology and pollution prevention,

monitoring, and evaluating the linkages between environmental pollutants and health and environmental impacts). This need will become even more critical as DENR implements new policies designed to use the power of public opinion to affect industrial environmental performance positively, such the business performance rating system discussed above.

Public reporting. Although few legal barriers appear to exist to public access to information on industrial discharges and environmental quality, major practical barriers do exist. First of all, information is seriously limited; DENR does not publish reports on a routine basis for public use. Donor assistance to DENR in implementing a focused public disclosure effort (e.g., publishing reports on industrial discharge data under the Pasig River Rehabilitation Project) could yield major results.

Comparative risk assessment. The Philippines provides fertile ground for a comparative risk assessment initiative intended to help government officials as well as NGOs and the private sector to sort out environmental priorities. A program exposing them to basic risk assessment concepts, for example, through the University of the Philippines or through the Department of Science and Technology could be an important start toward a systematic approach to priority setting.

Enhancing the Philippines environmental professions. The Water Environment Association of the Philippines, established last September with the assistance of the US-AEP Professional Association Development initiative, is off to a good start. This organization of environmental professionals could provide an important venue for sharing information among environmental professionals in the public, private, academic, and NGO sectors.

Industrial Environmental Management

ISO 14000. Collaboration with BPS in implementing ISO 14000 should be vigorously pursued. BPS is extremely interested in becoming proactive on ISO 14000, although little has been done to date. Donor assistance to BPS and other agencies involved in ISO (e.g., DENR and ITRI) could be leveraged to promote ISO 14000.

Industry-led environmental initiative. Philippines Business Agenda 21 indicates industry's commitment to environmental management. This industry-led initiative could provide a catalyst for mobilizing public/private partnerships to directed to improved industrial environmental performance.

Technology transfer. The Industrial Technology and Development Institute is aggressively pursuing programs to make the institute more directly relevant to the private sector. The institute recognizes the need to become more proactive in assisting industry with technology transfer activities concerning clean technologies and has a need for better access to clean technology information (much of its environmental technology orientation is currently to end-of-pipe options).

In addition, DTI's expressed interest in promoting environmental extension programs should be pursued. Furthermore, extension programs that are already in place, such as MERALCO's outreach program, might benefit from the experience of environmental technology extension in the United States.⁵⁴

Environmental considerations in the financial sector. The Philippine banking industry has clearly begun to appreciate the importance of environmental risk, as evidenced by the establishment of environmental programs within Landbank and the Development Bank of the Philippines. Support to other financial institutions in implementing environmental due diligence programs could provide major environmental returns.

Environmental Infrastructure

Privatization. The USAID's BOT Center has been effective in the Philippines. BOT Law (Republic Act 7718) allows the private sector to build, own, and operate necessary public infrastructure and addresses issues to allow for a market-based rate of return. The BOT Center has been primarily focused on power projects but has designated about 10 percent of its pipeline projects to the water and waste sectors. In a remarkably short period of time, BOT financing arrangements have become the norm in the Philippines. According to officials at MWSS, thirty small cities are active in privatization. Eighteen BOT projects, costing a total of more than \$2.5 billion, are either complete or under construction.

Investment in environmental infrastructure. The overall potential infrastructure market is estimated at \$4 billion, with current activities totaling about \$400 million. USAID has largely focused on Mindanao in the water and solid waste sectors and is now assisting the GOP in finding investors. USAID has made more than \$1 million available primarily for feasibility studies and contract management. Projects tend to be too small, so USAID is seeking ways to package them to help bring in investors. In addition, according to local industry contacts, Mindanao appears to be an investment opportunity because of the good rainfall and climate, close proximity to shipping and the new airport at General Santos. The best opportunities, in order, are at General Santos, Davao, Cacayan De Oro, Iligan, and Zamboanga (site of tuna industry).

In addition, the Philippine National Oil Company (PNOC) is a government-owned energy company that has established a separate subsidiary (PNOC Petrochemical Development Corporation) to develop a petrochemical industrial estate in Bataan. The estate may ultimately reach \$1-2 billion in investments. Petrochemical facilities in the industrial estate will require water supply and treatment and wastewater treatment.

Training. Training is needed to improve utility operations and reduce nonrevenue water use. Philippines water utility managers need training on trends in municipal finance and the range of possible financial instruments for private operations.

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Endnotes

1. Philippines (1996).
2. World Bank (1994b).
3. Philippines (1996).
4. Twelve sectors account for about 70 percent of exports in 1995: garments, textiles, yarns, and fabrics; basketwork; holiday decor; decorative ceramics; jewelry; furniture; processed food; marine products; seaweeds; marble; electronics; and metal products (Philippines 1996).
5. World Bank (1994a, 4–6).
6. ASEAN (1993); Lisa Lumbao, commercial/environmental specialist, US-AEP, Manila (September 19, 1996).
7. World Bank (1993, ii); ASEAN (1994b, 120).
8. World Bank (1993, ii).
9. ASEAN (1994b, 128).
10. ASEAN (1993).
11. World Bank (1993, 21).
12. Philippines (1996, 55–56).
13. World Bank (1995b, 37).
14. ASEAN (1996).
15. ASEAN (1994a).
16. Narcisa Umali, director, Agriculture Staff, Philippines Council for Sustainable Development, National Economic Development Agency, Manila (April 30, 1996).
17. Dr. Rogelio A. Panlasigue, director, Industrial Technology and Development Institute, Manila (May 2, 1996).
18. See Philippines (1994a) for the most recent National Energy Plan.
19. ASEAN (1994a).
20. World Bank (N.d., PHPA4613).
21. Philippines (1996, 33).
22. The bulk of Philippine environmental legislation was enacted during the Ferdinand Marcos era (middle to late 1970s) in the form of presidential decrees (PD), rather than acts of Parliament. The laws laid down general principles: “There is now an urgent need to formulate an intensive, integrated program of environmental protection” as stated in PD 1151 (the Philippine Environmental Policy); but it remained vaguely worded and lacked clear guidelines (Allen 1992, 253). The major laws and decrees relevant to industry and urban environmental management include:

- *PD 1151, Philippine Environmental Policy (1977)*

This law is a vague and brief recognition of the need for measures to protect the environment and introduced the requirement that private corporations and national agencies, including government-owned corporations, must submit environmental impact statements (EISs) for planned projects that will have a significant impact on the environment. The EISs must include (a) a detailed statement noting any potentially adverse impacts of the proposed project, (b) alternatives to the proposed project, and (c) a determination that the short-term use of the environmental resource is consistent with its long-term productivity (ASEAN 1994b, 132)

- *PD 1152, Philippine Environmental Code (1977)*

Broader in scope than PD 1151, this decree notes the “need for controls and standards of pollution and the ‘rational exploitation’ of natural resources” (Allen 1992). This code led to the development of a comprehensive environmental protection and management program, including provisions for establishment of standards and regulation of air quality (including noise), water quality, land use management, natural resource management and conservation, and waste management (ASEAN 1994b, 132). It provides incentives for importation of pollution control equipment and offers tax credits for the purchase of locally manufactured pollution control equipment as well as tax deductions for expenses incurred for research and development on the manufacture of pollution control equipment. It is important to note, however, that these incentives and credits lapsed in 1984 and were never reinstated by the GOP (ASEAN 1994b; Allen 1992)

- *PD 1586 (1978)*

Established a system of EISs, which was meant to address the increasing pollution problems inherent in industrial growth. In principle, only those projects and areas deemed “environmentally critical” fall within the purview of PD 1586.

- *EO (Executive Order) 192 (1987)*

Created the Department of Environment and Natural Resources (DENR) from the already existing Department of Environment, Energy, and Natural Resources as well as the Environmental Management Bureau and the Pollution Adjudication Board. DENR is charged with promoting sustainable use and sound management of natural resources and the protection and enhancement of environmental quality. DENR is empowered to promulgate rules and regulations for the control of air, water, and land pollution as well as for ambient and effluent standards for water and air quality, including allowable levels of other pollutants (ASEAN 1994b).

- *RA (Republic Act) 6969 (1990)*

This act addresses risks posed by chemicals either imported to or manufactured in the Philippines. With the development of the Philippine Inventory of Chemicals and Chemical Substances, DENR has screened out the chemicals and chemical substances that potentially pose unreasonable risks to public health, the workplace, and the environment (Philippines 1995); however, although the act requires generators of hazardous waste to dispose of it in approved hazardous waste treatment/storage/disposal sites, not a single site yet exists in the Philippines (Philippines 1995).

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- *National Air and Waters Law, RA No. 3931 (1964)*

This was the first comprehensive law on air and water pollution in the Philippines. It “declares as national policy the maintenance of reasonable standards of purity for the waters and air of the Philippines” (ASEAN 1994b, 132)

- *RA No. 7718 (1994)*

This act amends portions of RA 6957, which authorizes “. . . the financing, construction, operation, and maintenance of infrastructure projects by the private sector, and for other purposes.” The government, in this act, recognizes the “indispensable role of the private sector as the main engine for national growth and development in the Philippines” and allows for the private sector to pursue build-own-transfer and other infrastructure projects with minimal interference from the government. The act was approved May 8, 1994, and was amended in 1995 (Philippines 1994b).

23. In its 1993 review of the Philippines’ environmental policies, the World Bank identified four generic issues:

- The implicit policy goals are ambitious; they attempt comprehensive coverage across all sources. Air and water standards apply to all industrial facilities regardless of size or pollution intensity. Similarly, although the EIS process applies to environmentally critical projects, the manner in which it is implemented in effect could require every investment project to obtain an environmental compliance certificate.
- The regulatory framework relies on standards applicable to all sources irrespective of type of industry or process.
- The policies currently in place are all command and control in nature and do not price environmental damage.
- Some of the environmental regulations are contradicted by other aspects of the sectoral policy regime (e.g., the pricing of fuels favors diesel fuel oil, and domestic coal to the detriment of air quality) (World Bank 1993).

Fines are imposed for discharge of pollutants, however, these fines have not been adjusted since 1976, despite several devaluations of the peso, leaving the fines largely ineffective as a deterrent to industrial polluters. Government-led spot monitoring has led to some factories installing wastewater treatment systems; the government has recently issued a number of cease-and-desist orders that have sent signals to the industry that DENR may be becoming more aggressive; however, existing wastewater treatment systems, most of which can be found in industrial enterprises located in and around Metro Manila, are often not properly operated or maintained. Other deterrents to industry’s investment in pollution abatement, as noted in a 1995 World Bank report (1995b), include weak enforcement of environmental standards, lack of incentives to invest in abatement equipment, and lack of information about cost-effective abatement strategies. Further, DENR water discharge standards are based on concentrations of pollutants rather than on total loadings to water bodies, allowing dilution as a means of compliance.

24. Floro R. Francisco, assistant general manager, Laguna Lake Development Authority, Manila (May 2, 1996).

Endnotes

25. The key components of the strategy are the following (ASEAN 1994b; Philippines 1990):
 - Establishment of environmental goals, policies, and standards, taking into account location, pollution control, waste management, occupational health and workers' safety, energy and raw materials usage, and disposal of toxic wastes
 - Support of policy, research, and economic and market-based instruments to promote recycling and reuse of industrial raw materials and by-products
 - Relocation of industry to locales outside of major urban centers through rural infrastructure development
 - Fiscal measures such as tax incentives, subsidies, pricing policies, and so on to encourage adoption of pollution control technologies by large- and small-scale industries
 - Vigorous enforcement of the EIS system in industry planning.
26. Maribelle Zonaga, senior program specialist, US-AEP, Manila (June 7, 1996) and Grace Favilo, executive director, Philippine Businesses for the Environment, Manila (May 7, 1996).
27. Jesus Motoomull, director, Bureau of Product Standards, Manila (May 2, 1996).
28. Dr. Rogelio A. Panlasigue, director, Industrial Technology and Development Institute, Manila (May 2, 1996).
29. Owen Cylke, US-AEP assessment team (September 25, 1996).
30. Owen Cylke, US-AEP assessment team (September 25, 1996); Antonio Oposa, Jr., attorney, Manila (May 2, 1996).
31. Shakeb Afsah, environmental economist, Policy Research Department, World Bank, Washington, D.C. (September 5, 1996).
32. Owen Cylke, US-AEP assessment team (September 25, 1996).
33. Jesus Motoomull, director, Bureau of Product Standards, Manila (May 2, 1996).
34. As of October 1996, Philippines Agenda 21 had not been published in final form.
35. Unless otherwise indicated, information in this section was taken from US-AEP (1996b).
36. World Bank (1993, 7).
37. Philippines (1996).
38. See "Philippines: Manila Second Sewerage Project" (World Bank N.d. PHPA4611).
39. ASEAN (1993); World Bank (N.d., PHPA4613).
40. ASEAN (1996).
41. US-AEP (1995a).
42. Dr. Ben Malayang III, professor, Institute of Environmental Science & Management, University of the Philippines at Los Banos, Laguna (May 3, 1996).
43. US-AEP assisted Land Bank in establishing its environmental unit by supporting an exchange between the bank and the Bank of America.

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44. Maribelle Zonaga, senior program specialist, US-AEP, Manila (June 7, 1996).
 45. USIA (1992).
 46. Floro Francisco, assistant general manager, LLDA (May 2, 1996).
 47. In the Philippines, two generic types of nongovernmental institutions exist: NGOs, which are service or issue-based, and peoples' organizations, which are geographically based. Peoples' organizations often rely on NGOs to provide technical assistance on specific issues. It is not uncommon, for example, for an NGO with expertise on a particular technical or legal issue to support a wide network of peoples' organizations.
 48. Rodwin (1995, 18).
 49. The Environment and Natural Resources Accounting Project (ENRAP) IV will have four components (Juan Seve, senior manager, International Resources Group, Washington, D.C. [September 16, 1996]):

- *Policy reform and advocacy*

The major groups served will be DENR, the U.S. Agency for International Development, the National Economic Development Authority, and the Philippine Council for Sustainable Development. DENR is reassessing its environmental management strategies; ENRAP IV will be able to provide timely and relevant policy inputs as required. The National Economic Development Authority has an ongoing long-term development planning exercise, which is expected to become more intensive and get more involved at the sectoral and regional levels. ENRAP should continue to play an important role in providing relevant information for the drafting of the Philippine Agenda 21. Another of ENRAP's tasks, which will have to be jointly coordinated by DENR and the National Economic Development Authority is the formulation of full-cost pricing mechanisms for environmental and natural resources. ENRAP IV's analysis will include formulation of specific economic instruments for full-cost pricing of these resources, focusing not only on policy objectives but on assessment of the enforcement/transaction costs, equity issues, and the likely degree of implementation.

- *Generation, updating, and monitoring of environmental natural resource data and indicators*

ENRAP III generated a micro-level, geographic-based data base, linking data on economics and environment. ENRAP IV will continue with data collection to fill gaps in the information on damage estimates for water and air pollution, trends in costs and demand for environmental quality, and estimates for the demand for direct nature services.

- *Institutionalization of environmental and natural resource accounting*

The objective is to ensure the sustainability of the Philippines environment and natural resource accounting (ENRA) process by encouraging and working toward institutionalization of the ENRA data system for use by those in government who are involved in analytical and development work. This process will involve continuation of ENRAP III efforts to link information systems and improve data development to allow for continuous tracking of economy-environment interactions at various levels.

Endnotes

- *Local and international linkages*

ENRA staff will work to enhance the skills of DENR personnel in building capacity for developmental work as DENR evolves from a primarily regulatory body to a development agency. This will include assisting DENR in shifting environmental and resource management away from command and control approaches to include instruments such as resource price rationalization, changes in investment planning processes, and enhancement of EISs with extended cost-benefit analysis.

50. World Bank (1995b, 89).
51. World Bank (N.d., PHPA4613).
52. World Bank (N.d., PHPA4611).
53. Lisa Lumbao, commercial/environmental specialist, US-AEP, Manila (September 20, 1996).
54. US-AEP (1995a).

country
assessment:
SINGAPORE

Prepared by:

US-AEP



UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



1998

Singapore

By Malcolm Forbes Baldwin

Singapore is a city state about three and a half times the size of the District of Columbia or the size of Fairfax County, Virginia. With more than \$19,000* per capita gross domestic product (GDP), Singapore is rich, clean, and export oriented. It is the only country on the Asian subcontinent that provides drinking water out of the tap.¹ Singapore has few natural resources, and most of its water comes from Malaysia. It began to integrate environment into its industrial policy in the late 1960s and has progressively improved it ever since. Singapore's industrial and environmental practices are driven by strong regulatory enforcement and pervasive recognition by government and industry that Singapore's markets and its future depend on effective environmental management as well as a competitive economy.

1. Economic Profile

Demographic Conditions and Trends

Singapore has a population of 3.1 million. Its low population growth of 1.1 percent a year from 1980 to 1993 contrasts with its high economic growth.² Unlike Malaysia, Singapore's population is dominated by Chinese; but, like Malaysia, Singapore faces a potential skilled labor shortage following its successful fertility control program in the late 1960s that resulted in a fertility drop of 70 percent in twenty years.³ The Singapore government now believes it can support a larger and growing population.⁴ Its new population policy envisages a faster population growth that might reach 5 million, but planners are addressing a projected population of 4 million.⁵ Despite such an increase, Singapore seeks to maintain its present multiethnic composition in which Chinese form about 77 percent of the population and Malays and Indians comprise 14 percent and 7 percent respectively.⁶

Economic Conditions and Trends

Singapore has retained its rank as number two in the World Economic Forum's 1995 World Competitiveness Report. As the world's seventh richest country, measured by GDP per person,⁷ its real GDP growth is projected to continue at high rates for the next several years. Unemployment has held at 2 percent; inflation is only 2–3 percent per year. Singapore's challenge is how to maintain its growth in the face of increasing labor, land, and other costs, and competition from Malaysia, whose expanding infrastructure, port development, and manufacturing base makes it of growing concern.⁸

2. Environmental Profile

Industrial and Urban Environment Background

At independence in 1963, Singapore had an unemployment rate of 30 percent, which drove economic policy toward high employment industries such as textiles and ship building. By the 1970s Singapore

acronyms

GDP	Gross domestic product
ENV	Ministry of Environment
EDB	Economic Development Board
JTC	Jurong Town Corporation
MTI	Ministry of Trade and Industry
SPSB	Singapore Productivity Standards Board
EIA	Environmental impact assessment
NGO	Nongovernmental organization
US-AEP	United States-Asia Environmental Partnership

moved on to encourage semiskilled work on electronics and parts for multinational corporations. At the same time, it began vigorously to attract multinational corporations themselves to Singapore. By the 1980s Singapore was able to increase taxes and enforcement measures in ways that drove many of the old high-employment but dirty industries out, while seeking to attract cleaner, less employment-intensive

industries. As a result, Singapore's economy is today dominated by high-value-added employment. Of its more than 3,000 multinational corporations, some 900 are from the United States and 900 from Japan. It boasts the world's second largest concentration of petrochemical industries and refineries.

Its environmental policy became thoroughly integrated into its industrial policy beginning in the late 1960s when the vision of a clean and green Singapore was articulated.⁹ Singapore's success is due to land use plans that were formulated and carefully implemented to (a) establish a financial urban center,¹⁰ (b) protect Singapore's water catchment (which provides some 30 to 40 percent of drinking water),¹¹ and (c) create an industrial area outside the catchment, zoned and managed for industrial development. These land use plans have been backed by a strong regulatory and enforcement structure developed around sophisticated monitoring and highly efficient government agencies. Singapore's Ministry of Environment (ENV) began as an antipollution unit in 1969 in the Prime Minister's Office and became a ministry in 1972. Since then, ENV has worked hand-in-hand with the powerful Ministry of Trade and Industry and its Economic Development Board (EDB) and Jurong Town Corporation (JTC), which manages the industrial estates. Today, Singapore's "Green Plan"¹² is a basic part of its economic development program. It has proved highly successful in attracting multinational corporation headquarters and regional offices for outreach and investment in Asia generally.

Industrial and Urban Environmental Conditions

Singapore is unique among Asian cities for its high quality environment:

- Today, essentially all of Singapore is served by sewerage systems.
- Air pollution levels are well within the World Health Organization's long-term goals and U.S. Environmental Protection Agency standards.¹³
- Solid waste management has high priority. Refuse collection has increased steadily. Fifty-two percent of solid waste is domestic and commercial. The remainder is from industry (42 percent) and institutions (1 percent).¹⁴
- Extensive monitoring and strong enforcement bolster its pollution policies.¹⁵

Singapore has led Asia and the world in managing vehicular traffic and pollution. ENV has high emission standards; vehicle numbers can only increase as road construction permits. Vehicle owners must pay high taxes of from 200 to 300 percent of the cost of the vehicle; none are allowed to remain in use more than ten years without facing rapid tax increases. A tax on leaded fuel is S\$0.10* per liter higher than unleaded fuel, resulting in lower lead levels.

Environmental Trends and Issues

Singapore's environmental pollution priorities illustrate the high quality of its environment. Noise pollution is one of the city's priorities, as is the elimination of odors from sewage treatment plants (because odors require a larger buffer zone and land is at a premium). The Singapore government is upgrading its urban pollution management system and will be spending approximately S\$3 billion upgrading its environmental infrastructure. New investment is largely focused on rehabilitating old sewers, new lift stations, and new sewers for new housing, waterfront developments, and new towns. Singapore is expanding its sewage treatment works and the treatment capacity of three existing facilities.¹⁶ The government has also established a vigorous waste-recycling scheme for residences and commercial sectors and waste minimization efforts with industry.¹⁷ Refuse collection is being "corporatized," which means operated by government on a self-sufficient basis, and eventually privatized.¹⁸

New challenges are coming, however. Existing landfill sites are now nearing capacity; management of hazardous and toxic wastes is receiving increasing attention within the industrial zone. Efforts are being made to reduce the number of zones judged subject to environmental hazards and to concentrate industries using hazardous materials.

3. Government

Government dominates this city state by shaping nearly every facet of political and economic life. Since the elections of 1963, the government has been ruled without interruption by the People's Action Party, which formulated the growth policies that have sought to bring increased wealth to all economic strata.¹⁹

* In January 1997, S\$1 equaled approximately US\$0.71.

Key Environmental and Industrial Ministries

Singapore's primary ministries concerned with environment and industrial development work closely to achieve a common policy. The ministries most concerned with industrial and urban affairs include the following:

The *Ministry of Environment* was until the early 1980s the only such ministry in Asia. Its staff of 7,000 has overall responsibility for Singapore Green Plan public awareness campaigns, environmental monitoring, and establishment of environmental regulations and enforcement. ENV led the successful effort to clean up the Singapore River,²⁰ introduced environmental auditing to Singapore, and is responsible for most refuse collection in Singapore. It also regulates vehicular emission standards. ENV has established a private consulting company, Singapore Environmental Management and Engineering Services, which hires ENV staff and works abroad on a consulting and contractual basis. ENV's public awareness activities include annual and long-standing tree planting efforts as well as antilittering and waste minimization programs.

The *Ministry of Trade and Industry* (MTI) plays a key environmental role. Its four divisions are trade and international business, industry, research and planning, and corporate services. Key boards under the ministry are the Economic Development Board, JTC, and the Singapore Institute of Standards and Industrial Research.

MTI's *Economic Development Board* has a network of international offices in the United States, Europe, Japan, and the Asian-Pacific region to initiate contacts with potential investors and promote Singaporean interests abroad. EDB is strongly engaged in promoting multinational corporation investment in Singapore and works closely with ENV and JTC to ensure that manufacturing remains at about 25 percent of GDP and that industry is increasingly at the high-value and high-return scale. EDB designed application and processing requirements for industrial and multinational corporation permits around what the public could understand and the information it could provide; EDB works closely with JTC and ENV on this permitting as well. EDB has established significant incentives for industries through taxes, grants, and loans.²¹ As part of Singapore's regionalization program, EDB tries to induce multinational corporations to go to industrial parks in Vietnam, Ho Chi Minh City, and elsewhere in China; they look for companies already comfortable working with Singapore companies. EDB has a clear sense of the kind of industry it wants to attract and exercises discretion on how it uses its package of incentives to induce multinational corporations into Singapore or regional activities.

MTI's *Jurong Town Corporation* is a statutory board in charge of the fiscal implementation of industrial development and manages about 10 percent of Singapore. It began as the Engineering Department within EDB but separated in the late 1960s. JTC allocates land to companies that may themselves build or that may occupy buildings established by JTC under a thirty-year lease (with an additional thirty-year option). JTC has built all the required infrastructure—sewers, roads, substations, electrical and communication lines in JTC's zone. Presently, half of the 500 companies in the zone are small- and medium-sized enterprises (ten to fifteen employees). On the offshore islands, which are sites for Singapore's petrochemical and

refinery plants, JTC contracts for major reclamation work for landfill to expand the site. All telecommunications, electrical, and other infrastructure are given to the appropriate government agency for a fee, whereupon it is managed by that agency. All JTC's infrastructure development costs are recovered in its leases. In the zoned industrial park of about 5,000 hectares, land is leased with the requirement that companies invest at least S\$1,005 per square meter.

JTC is totally self-financing; it pays property taxes to the government and buys land for development from the government at market prices. In selecting new tenants, JTC reviews applicants' information and reviews all information with EDB and ENV. All inquiries are screened within nine days and responses are obtained from ENV within a week. If ENV needs more information, JTC directs the companies to provide it directly to ENV. Like EDB, JTC looks to high-value-added, low labor, high land productivity, low space, and not hazardous industries. Also like ENV, JTC has an international arm, JTC International, which helps build and operate industrial parks in China, Vietnam, and Indonesia. About half of JTC's staff of 1,000 support JTC International.

MTI's *Singapore Productivity Standards Board (SPSB)*²² is a self-supporting statutory board established in 1973 that conducts research and development similar to that of Korea's Institute of Science and Technology or Taiwan's International Technology Research Institute, with whom it has links. It primarily seeks to develop technology for Singaporean companies. It also does testing and certification of ISO 9000²³ and will carry out ISO 14000 certification in the future. SPSB works closely with EDB to identify supporting services it might carry out through EDB's international consulting wing—Novo Technology Development, which draws on SPSB's staff for joint ventures abroad.²⁴ Currently, most of SPSB's clients are small- and medium-sized enterprises.²⁵ SPSB's *Regional Institute of Environmental Technology* is a joint Singapore–European Union project to promote and facilitate use of appropriate environmental technology in Asia by European–Singaporean and regional cooperation. It provides information to European and Asian firms on technology, best practices, regional and country policies, markets, and business opportunities relating to environmental management and technology. Corporate environmental management and ISO 14000 are of particular interest.²⁶

The *Ministry of National Development's Urban Redevelopment Agency* carries out Singapore's comprehensive planning process for the government and the private sector. The agency works in cooperation with ENV, EDB, JTC, and other boards to implement the concept plan that carries out the master plan.²⁷

The *National Science and Technology Board*, established in 1991 under MTI, resembles the U.S. National Science Foundation. It does not carry out research and development but gives grants. It also seeks partnerships with U.S. companies in high technology fields and works with EDB and Singapore's seven research institutes and seven research centers. Key goals of the board include that Singapore have the most advanced infrastructure and that Singapore move rapidly up the ladder toward clean technology.

4. Policies and Laws

Singapore's approach to environmental pollution management is, in order of priority, prevention, monitoring, and enforcement. Perhaps more than any other country in Asia, Singapore has shaped environmental policy based on the notion that government should lead the way and actively promote a clean environment rather than simply react to environmental problems.²⁸ The law is important in Singapore: enforcement is rigorous, and environmental laws are taken seriously. Singapore is currently reviewing its environmental laws and drafting new environmental management and protection legislation in ways that will improve their integration.

Environmental Policies and Laws

Singapore has a sophisticated array of laws concerning air, water, solid waste, noise, and other pollution, in addition to a strong planning system.²⁹ A new hazardous waste law now establishes a much higher S\$10,000 fine for first violations and S\$20,000 and a jail term of one year for second violations.

Industrial Policies and Laws

Singapore's environmental laws are shaped and administered with balanced sensitivity to the requirements of industry. On the one hand, strict and effective enforcement of environmental standards is the bedrock of Singapore's approach. On the other hand, implementation of environmental laws is dominated by administrative discretion that responds to needs and practical circumstances of industries seeking new permits. To some extent, the discretion given ENV and its cooperation with EDB and JTC have fostered a system that permits some degree of negotiation for the kind of permits and timing of the standards required. Owners of polluting industries are not tolerated; however, owners of contaminated areas may be able to negotiate with ENV over time on cleanup standards and schedules.

ISO 14000. Government regulation has been the main impetus for many of Singapore's home industries, whereas most multinational corporations are progressive in using clean production techniques and environmentally sound practices to promote environmentally friendly images to the public. Many local industrial enterprises, however, do not have the knowledge of clean production methods and advances to make changes in their industrial processes. They are, therefore, less likely to adopt such changes in the absence of awareness-building efforts. Despite this tendency, however, the ISO 14000 standards and guidelines have attracted keen interest within both ENV and the newly named SPSB and are likely to be adopted. The European Union has a strong program with SPSB which, among other things, has focused on ISO 14000.³⁰

Public Information Policies and Laws

Public interest law is not a force in Singapore; advocacy and pressure work less well than cooperation and engagement. Environmental impact assessments (EIAs) are not required by law, not public when completed, and often regarded as not needed for every project, although they are sometimes looked on as important requirements that are inadequately applied to address natural habitat issues on the island.³¹

5. Urban Environment and Infrastructure

Singapore's approach to its environment and provision of infrastructure responds to its industrial strategy. It has vigorously encouraged multinational corporations to locate their corporate or regional headquarters in the country and has sought manufacturing that is high value added, highly productive, but low in labor and space requirements. Hazardous industries are now discouraged, just as in the 1970s Singapore discouraged dirty industries and activities.³² Increasingly, the nation seeks partnerships between Singapore investors in the region and European, Japanese, or U.S. firms. These industrial goals are reflected in EDB's major strategies:

- *Manufacturing 2000* is intended to sustain manufacturing at 25 percent of GDP and outlines action plans for major sectors, including aerospace, petroleum and petrochemicals, specialty chemicals and pharmaceuticals, electronics components and systems, heavy and precision engineering, and light industries.
- *International Business Hub 2000* envisions Singapore as a hub of international business and trade by the year 2000.
- *Regionalisation 2000* will build a strong external economy that is closely linked to and enhances the domestic economy. EDB will identify opportunities and bring together partners to participate in the Asian-Pacific economy in mutually beneficial ways.
- *Local Enterprise 2000* will build promising Singaporean enterprises into multinational corporations and industry leaders in their own right.³³

The urban environment continues to be shaped by the long-range *Singapore Green Plan*, which was intended to "cultivate an environmentally conscious population, promote resource conservation and clean technology, and increase efforts in protecting the local and global environment." The government of Singapore intends to achieve the following targets by the year 2000:

- Higher standards of health and environmental cleanliness
- A more environmentally conscious and proactive business sector
- Establishment of the city-state as an Asian-Pacific regional hub for the transfer and marketing of environmental technology and expertise³⁴
- Transformation of Singapore into a "model green/environmental city." Policy objectives include cultivating a clean and healthy environment, an environmentally conscious and responsible people, and a focal point for regional and international environmental activities. Emphasis will be placed on public education and promotion of Singapore as a regional center for environmental technology.

Urban infrastructure is a high priority for investment. Singapore is a center for regional infrastructure investment as well, with large investment plans and projects in India, China, and countries in the Association of Southeast Asian Nations.³⁵ Singapore is planning an estimated S\$3 billion upgrade of its own environmental infrastructure water supply, wastewater, and solid waste facilities.

Water Supply

Watershed management through land use planning that has protected its catchment basin has long been critical to Singapore's water supply from its own territory. That program remains important, but 60 to 70 percent of its potable water is piped in from Malaysia. Singapore and Malaysia are debating water rights and proposed increases in pricing. Black & Veatch/Binnie is providing consultancy services to the Public Utilities Board for a deep-tunnel water project estimated to be worth S\$2 billion.

Wastewater

ENV is upgrading sewage treatment at four facilities at an estimated cost of S\$950 million.

Solid Waste

ENV is designing a solid waste landfill and upgrading several sewage systems, for which Black & Veatch/Binnie is providing the consulting work. The market for incinerator projects in 1997 has been estimated at S\$2 billion.

Hazardous Waste

The main industrial waste site for hazardous waste is now within JTC's industrial zone, where large firms treat hazardous waste on site, whereas the smaller companies pretreat it before sending it to sewage treatment facilities.³⁶ Some new contamination issues are showing up as old leases expire in the industrial zone; concern is increasing about how toxic waste is disposed of and whether or not it is sometimes illegally exported instead.³⁷

6. Private Sector and Academia

Industrial Organizations

Several industrial organizations play important roles, some with strong governmental involvement. Among the important industrial organizations are the following:

- The *Singapore Association of Environmental Companies* is an independent nongovernmental organization (NGO) and self-funding organization formed in 1994 and dedicated to facilitating environmental business and technology transfer. Also intended to act as a bridge between developing and developed countries in promoting environmental technology, the association would like to establish Singapore as an environmental technology center. It seeks memoranda of understanding with environmental agencies and bodies from other countries to establish a pool of technology resources for industry's use and application.
- The *Environmental Business Information Center* was set up to facilitate linkages with information networks in other countries and to provide data on environmental business in the region, export and investment opportunities, and contacts with foreign companies.

- The *Singapore Confederation of Industries*, formerly, the *Singapore Manufacturers Association*, represents an important potential contributor to clean technology in the industrial sector. Some 90 percent of Singaporean manufacturers are component suppliers to multinational corporations. Most are small: the average member of the confederation has a staff of about 100.³⁸ The Singapore Confederation of Industries has developed an industrywide campaign to encourage all companies in Singapore to sign the Singapore Business Charter for Sustainable Development. Chief executive officers are encouraged to sign the charter and make employees aware that the company is adhering to its environmental management standards. So far, 1,200 companies have signed on; a directory called “The Green Pledge” lists all the signatories. The confederation operates the United States-Asia Environmental Partnership’s (US-AEP’s) *Center for Clean Industrial Technology and Environmental Management* in Singapore.
- The *Singapore Chemical Industry Council*, including more than seventy chemical, petrochemical, and pharmaceutical companies, has developed a “Responsible Care Programme” to teach its members how to incorporate sustainable practices into their businesses. The council provides training to contractors who supply this industry sector. Since its inception in 1990, this program has been actively promoted; the council has worked closely with ENV to go beyond regulatory requirements for pollution control and mitigation.

Financial and Research Organizations

Key banking institutions include several that are engaged regionally.³⁹ A number of research institutes that are associated with the Nanyang Technological University engage in environmental technology.⁴⁰

7. Environmental Awareness and Public Awareness

General Public Awareness of Environmental Issues

Since its formation, ENV has engaged in constant environmental public awareness campaigns, but the first such campaign on making Singapore a clean city was held even before independence in 1959. Tree planting has been a long-standing campaign (and a long-held concern of former President Lee Kwan You), as well as antilittering and waste minimization.

Nongovernmental Organizations

An ongoing challenge often cited in Singapore, however, is that “[b]y taking care of everything’ the Government has to accept the criticism that it has created a fairly passive citizenry.” Levels of public understanding of environmental problems are cited by some as uncommonly low. Opportunities for NGOs to become more active are so far limited. Unlike other Asian countries, the United States, or Europe, Singapore has no NGO “environmental movement.”⁴¹ The oldest, best-known Singapore environmental NGO is *The Nature Society*, which began as a branch of the Malayan Nature Society. It focuses on natural area conservation issues and engages in the planning process, impact assessment, and other nonconfrontational activities. In 1990 the government set up *The National Council on the Environment*,

now known as the *Singapore Council for the Environment*. The council is a voluntary organization made up of private and corporate sector members and members of the media. It operated under ENV and has been the most active in the Singapore Green Plan Action Program. Its aim and tasks have been to promote environmental awareness; organize seminars, workshops, and campaigns for environmental awareness; provide environmental awareness seminars for businesses and handbooks for industry; and educate consumers and students on green activities.⁴²

The Media

Although Singapore's media generally reflect government perspectives, environmental issues receive regular attention. A new development is the service of three local Internet providers, which now reach 5 percent of the population.⁴³

8. U.S. Government Agency Activities

U.S. government activities in Singapore have included the establishment of a supply logistics base for the U.S. Navy in the late 1980s and ongoing promotion of U.S. agricultural exports by the Agricultural Trade Office of the U.S. Department of Agriculture.

US-AEP Activities in Singapore

US-AEP has supported 22 environmental exchanges, processed 269 trade leads, and sponsored 20 technology grants through the National Association of State Development Agencies. With the U.S. Environmental Protection Agency, US-AEP has supported environmental action teams and short-term technical assistance.

9. Other Bilateral and International Engagements

Japan has made disbursements to Singapore that after 1989 have been in the form of technical cooperation grants. The total disbursements between 1989 and 1993 for technical cooperation grants was \$197.5 million.

Canada's International Development Research Center is a Canadian public corporation whose activities focus on implementation of Agenda 21, the global action plan for sustainable and equitable development. Singapore is the regional office for Eastern and Southeast Asia.

The *German government* has established a large trade center, managed by German industry, in Singapore to promote regional trade in environmental and other technology.

The *World Bank* and *Asian Development Bank* do not have any programs in Singapore at this time.

Singapore is a member of the U.N. Environment Programme's *International Environmental Information System* (INFOTERRA).

10. Opportunities to Support Clean Production and Environmental Management

As a highly developed city-state with a substantial international impact in Asia, Singapore is unique; yet, it offers lessons as well as opportunities for regional changes. Singapore has critical regional influence; its "... greatest potential as an environmental market lies not in projects for local clients but as a center for the distribution of environmental equipment and services to other countries in the region."⁴⁴ Singapore is also a model for other cities throughout Asia that have increasing responsibilities for their urban and industrial management; the nation demonstrates how a city can be made healthy and attractive and how industrial and environmental policy can be productively linked.

To be the regional center for multinational corporations that Singapore wants and needs to be, it must also keep up technologically and environmentally. Its effective command and control system has arguably worked so well that it has sometimes discouraged clean technology in favor of efficient end-of-pipe solutions. But now that ENV is seeking ways to reduce staff and costs, Singapore itself is a market for advanced environmental and industrial policy approaches, cost-effective clean technology, and the most efficient infrastructure investments.

Policy Framework

There are several key environmental/industrial policy priorities in which U.S. government agencies, businesses, and NGOs might engage with Singapore.

Market-based incentives. Singapore is likely to mix its effective but increasingly costly command and control system with more cost-effective and incentive-driven approaches. Regional workshops and exchanges can help it become a center for clean technology by increasing knowledge of specific market-based incentives favoring clean production and greater industry self-enforcement.

Mechanisms for technology assessment and urban planning. Singapore's experience with urban green and clean planning and management is of broad regional interest and appropriate for regional programs concerned with the use of environmental information for decisionmaking, including EIAs, technical assessment methods, and assessment techniques for incorporating clean production into new industrial estates.

Cost-effective technologies. With Singapore's growing interest in achieving clean production, the nation would benefit by programs that analyze cost-effective clean technologies in the United States and foster exchange programs to the United States with ENV, JTC, and EDB on the economics of clean technology and new market-based incentive approaches.

Demand-side management. Singapore is a potential market for policy analyses and exchanges focused on demand-side management systems for water consumption and waste production. Exchanges on the technical aspects of EIAs in assessing these factors would also be useful.

Industrial Environmental Management

US-AEP has recently established a Clean Technology Information Center in Singapore. As elsewhere, consideration should be given to stimulating interest in U.S. clean technologies through video conferencing that allows Singaporeans to become acquainted with the application of clean technology in the United States.

Toxic release inventories. Toxic and hazardous waste is a growing concern in Singapore. Experience with this issue in the United States and elsewhere, including toxic release inventories and industrial pollution intensity measures, could be shared through exchanges, workshops, and joint policy analyses of opportunities and experiences practical for Singapore.

Clean production in new regional industrial estates. Singapore's regional investment role offers a signal opportunity for joint U.S.-Singaporean ventures in the Asian region that can introduce cost-effective clean technology in these developments.

Environmental Infrastructure

Privatization. Singapore has no plans for immediate privatization of environmental infrastructure, although it has successfully privatized its telecommunications sector. The Public Utilities Board is the key authority for future decisions on privatization; the order of privatization is expected to be first power, then water, waste collection, and landfills. Peat Marwick & Morgan Grenfeld were appointed to advise the government on how to approach a privatization plan.

Water supply. Future water supply projects may include construction of a pipeline to bring water from Indonesia, because it now comes from Malaysia. Singapore and Malaysia are negotiating questions about water rights and price increases. Desalinization projects are also under consideration. Black & Veatch/Binnie is providing consultancy services to the Public Utilities Board for a deep-tunnel water project estimated to cost \$2 billion.

A few major business opportunities exist in the environmental infrastructure market other than upgrading the existing facilities. Most new opportunities in Singapore for U.S. firms revolve around links to major Singapore investors and developers as they pursue environmental infrastructure projects in the region.

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Endnotes

1. *The Economist* describes Singaporeans as living “. . . in the cleanest, greenest, most modern and efficient city in South-East Asia. And they are affluent.” (“Singapore’s Sheepdog Trials” [September 14, 1996, 33].)
2. World Bank (1995). Growth in per capita gross national product was 6.1 percent (1982–93).
3. Ling (1995, 101).
4. Ling (1995, 101).
5. Population density in Singapore is one of the highest in the world at 4,500 peons/square kilometer (Ling 1995, 105).
6. Ling (1995, 106).
7. “Singapore’s Sheepdog Trials,” *The Economist* (September 14, 1996), 33.
8. “Determined to stay ahead,” *The Financial Times* (November 27, 1996), 11.
9. The Minister of Health made this statement in 1968 before the Parliament, reflecting the clear views and preferences of President Lee Kwan Yew, although the first master plan for Singapore in 1958 cited the need for a “clean and green city.”
10. Singapore’s Land Acquisition Act in 1966 gave the government authority to (a) take property without recourse except with respect to compensation terms and (b) assemble urban land for resale in blocks suitable for redevelopment and construction of a modern financial district, hotels, and condominiums (Ling 1995, 122.)
11. Duck farms and piggeries were removed, squatters were resettled, backyard trades and industries were also resited (Ling 1995, 19).
12. The Singapore Green Plan was presented at the Earth Summit in Rio de Janeiro, Brazil, in June 1992; the nation’s action program includes environmental management and infrastructure, encouragement of clean technologies, environmental technology, and building of environmental consciousness and corporate responsibility on the environment. The plan governs the activities of all Singapore government agencies.
13. Ling (1995, 19, 20).
14. Ling (1995, 17).
15. ENV conducts monthly monitoring of water quality for forty-seven streams and thirteen reservoirs and all monitoring of individual industrial plants at sewer entry points. Automatic valves shut if the pH is above or below proper limits; ENV is immediately notified by telemetry. Only ENV can open the valves again. In 1994 ENV carried out more than 4,000 inspections on industrial premises and more than 11,000 inspections on nonindustrial premises. Of the 871 warning letters issued, 179 cases were prosecuted under the Clean Air Act, Water Pollution Control and Drainage Act, Poisons Act, and the Environmental Public Health Act (Ling 1995, 20).
16. Singapore (1994, 13).
17. ENV personnel recently visited Seattle to investigate experience there with domestic recycling but found their own problems more difficult because high-rise refuse shoots do not permit easy segregation of refuse (ENV, Singapore [March 1996]).

Endnotes

18. Refuse collection is now subsidized.
19. Campos and Root (1996, 39).
20. Ling (1995, 18).
21. Presently EDB offers an investment allowance for plants able to recycle water to offset up to 50 percent of capital investment against income. EDB offers soft loans of 3.5 percent to lease automation equipment and a write-off of equipment for pollution control in one year. Its pioneer program offers a tax holiday for five years on income produced for high-value-added companies. It offers incentives of 70 percent of the consulting cost of automation feasibility studies as well.
22. Recently renamed but formerly the Singapore Institute of Industrial Research (SISIR), SPSB is still within the Ministry of Trade and Industry.
23. It has certified 700 of the 1,000 ISO 9000-certified companies in Singapore (SPSB, Singapore [March 1996]).
24. See SISIR (now SPSB) (1995).
25. SPSB works for multinational corporations to improve the quality of the work done for them by Singapore suppliers. SPSB took Singapore supplier representatives to the United States, Japan, and Germany to examine precision stamping of components (all arranged by EDB). It will do automation studies for suppliers in Singapore and will do automation feasibility analyses for EDB to determine eligibility of potential soft loan recipients. It works extensively for the Housing Development Board, the biggest user of materials in Singapore, to do specifications for tenders (SPSB, Singapore [March 1996]).
26. RIET (1994); SPSB, Singapore (March 1996).
27. The Master Planning Committee, chaired by the chief planner of the Urban Redevelopment Agency, allocates land for various uses, determines intensities, and addresses land use conflicts. Development Guide Plans then translate these plans into local geographical context and visual settings. Environmental impact assessments, if deemed necessary, may be required to assess impacts of new developments on heavily built up or environmentally sensitive areas.
28. Singapore's experience belies the often expressed observation that the concerns and actions of nongovernmental organizations and citizen associations shape issues and instill urgency that make policymakers and legislators respond. Soon after independence, Singapore's political leaders perceived a clean environment as essential to economic prosperity.
29. See article, "Environmental Protection: The Legal Framework" (Ling 1995, 47-99).
30. An SPSB market study from mid-1995, which gauged interest in ISO 14000 among companies in Singapore's private sector, reported the following:
 - 47 percent of companies are in favor of implementing ISO 14000, citing as their reasons both a moral responsibility toward the environment and a desire to be recognized as environmentally conscious.
 - 37 percent of companies were neutral mainly due to lack of information/understanding as to what exactly ISO 1400 entails.
 - 16 percent are not interested due to the lack of a pressing need to become certified.

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31. See article, "Environmental Protection: The Legal Framework" in Ling (1995) for a discussion of the legal aspects of environmental protection in Singapore and the laws relating to pollution and enforcement. This source reviews the laws on air pollution (the Clean Air Act, Controls of Vehicular Emissions and Air Quality Monitoring, Noise Legislation, Public Order and Nuisance Acts, Environmental Public Health Acts, and Water Pollution and Waste Management Acts) along with international conventions to which Singapore is a signatory.
 32. Sawmills and granite and sand-processing quarries have been moved offshore to various small islands and in some cases to neighboring Indonesia.
 33. See Singapore (1995).
 34. See Allen (1992).
 35. Singapore has the largest cash reserves—more than \$65 billion—in the world. The Singapore Government Investment Corporation was established to make investments outside of Singapore. The corporation is a co-investor in the Asia Infrastructure Fund, which has large amounts of equity (US-AEP 1996).
 36. US-AEP (1996).
 37. The assessment team heard concerns about the possible export of toxic waste to Thailand as well as dumping in the Straits and the South China Sea.
 38. Jayarana Menon, director, Manufacturing Services, Singapore Manufacturers' Association, Singapore (March 1996).
 39. See Rodwin (1995). The Government of Singapore Investment Corporation was established to make investments outside of Singapore, including a \$200 million investment in the Asia Infrastructure Fund. The corporation noted the following hurdles with environmental infrastructure sector investments: high levels of nonrevenue water, municipal water companies in deficit, and a need for good foreign operating partners. The corporation is looking at two projects in China dealing with water, wastewater, and waste management. It is also reviewing a Penang water supply project.
 40. Some examples include the following:
 - *Gintic Institute of Manufacturing Technology* was formed as a national research institute within the Nanyang Technological University and funded by the National Science and Technology Board. Gintic's major tasks include research and development to identify processes and technologies to modernize Singapore's manufacturing industry, upgrade local manufacturing facilities to keep them competitive, and transfer technical results from applied research and development to local manufacturers.
 - The *Environmental Technology Institute* was established by the National Science and Technology Board with a mandate to establish a world-class infrastructure to make Singapore's environmental technology industry more competitive. The institute is also run through Nanyang Technological University.
 - The *Institute of Environmental Epidemiology* conducts regional courses, training, research, and consulting services on environmental health-related problems, including toxic chemicals and carcinogens, and, together with regional counterparts, will research and review projects to provide quality assurance in this area.

Endnotes

41. See Ling (1995, 298), citing Allen (1992, 265).
42. Ling (1995, 292). Descriptions and lists of other Singaporean NGOs are cited on pp. 292–95.
43. New government controls are anticipated on the content of Internet material (“Singapore’s Sheepdog Trials,” *The Economist* [September 14, 1996], 34).
44. ASEAN (1993, 47).

country
assessment:
SRI LANKA

Prepared by:

US-AEP



UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



16014

Sri Lanka

By John Butler

Sri Lanka, roughly the size of West Virginia, is one of Asia's most densely populated countries, yet it boasts magnificent natural scenery and habitat for wild species that include several thousand elephants. At independence in 1948, its per capita gross domestic product (GDP) was matched by Korea's and its high literacy and stable government promised a bright economic future. Subsequent policies of nationalization and import substitution along with ethnic strife, however, have inhibited growth. Despite setbacks, economic liberalization has proceeded since 1977. Democratic institutions have been maintained; cultural regard for the environment is strong. Although public information on the environment is poor in general, Sri Lanka's environmental impact assessment (EIA) process is among the most transparent in Asia.

1. Economic Profile

Demographic Conditions and Trends

Population, estimated at about 18.3 million,¹ has been projected to stabilize at 25 million by 2046.² The birth rate has dropped from 5.0 per woman in 1960 to 2.7 in 1990. In spite of its low annual per capita income, Sri Lanka has achieved high adult literacy and primary education rates, high life expectancy, and a low infant mortality rate. The United Nation's Human Development Index placed Sri Lanka among the fifteen countries with the highest index ratings.³ Sri Lanka's urban population, at roughly 25 percent, has grown steadily in proportion to overall population but at a considerably slower rate than other Asian countries.⁴

Economic Conditions and Trends

Sri Lanka began its independence with high expectations that its Sinhala, Tamil, and Moslem populations and English-speaking heritage would forge secure political and economic structures.⁵ Sri Lanka's economy in the 1950s and 1960s depended largely on exports of tea, rubber, and coconut. In the 1960s the government nationalized banks, utilities, and transportation; in the 1970s it pursued import substitution; nationalization of steel, sugar, cement, petroleum, and other industries; and strong socialist land ownership and pricing policies. In late 1977, however, it launched a liberalization program that has since largely continued market-oriented policies. These have resulted in higher growth rates and, as population rates continued to decline, nearly 4 percent growth per capita, until a rapid decline in the middle to late 1980s⁶ largely caused by costly ethnic and civil strife.⁷

Despite protracted civil disturbance, Sri Lanka's GDP grew at a rate of 5.5 percent in 1994 and 1995, down from 6.9 percent in 1993, the highest since economic liberalization. Industry contributes about 26 percent to GDP; garment manufacturing and food processing predominate. Agriculture accounts for 25 percent of GDP, whereas the service sector makes the largest contribution at 50 percent.⁸

acronyms

BOI	Board of Investments of Sri Lanka
BOO	Build-own-operate
BOT	Build-own-transfer
CEA	Central Environment Authority
CIP	Core Investment Plan
EIA	Environmental impact assessment
GDP	Gross domestic product
GOSL	Government of Sri Lanka
ISO	International Organization for Standardization
M/TEWA	Ministry of Transportation, Environment, and Women's Affairs
M/ID	Ministry of Industrial Development
NAREPP	Natural Resources and Environmental Policy Project
NEAP	National Environmental Action Plan
NGO	Nongovernment organization
PIP	Public Investment Program
RTSC	Regional industry service committee
UDA	Urban Development Authority
US-AEP	U.S.-Asia Environmental Partnership
USAID	U.S. Agency for International Development

2. Environmental Profile

Industrial and Environmental Development Background

Sri Lanka's economic development after independence in 1948 was characterized by a focus on tea, rubber, coconut, and agricultural promotion in the 1950s and 1960s. Nearly 80 percent of Sri Lanka's land was then and still is owned or managed by government agencies. During the 1970s, Sri Lanka began a massive hydroelectric and irrigation program on the Mahaweli River, which today provides 90 percent of Sri Lanka's electrical energy.⁹

Sri Lanka's industrial development has fostered industries that are small and medium sized; those averaging \$40 million* a year in gross revenue are considered "large." Approximately 15 percent of the industrial sector is government owned, although Sri Lanka has privatized steadily during the past nearly twenty years. Key industries include rubber processing, tea, desiccated coconut, wood commodities, metal finishing, leather tanning, textiles, garment assembly and washing, gems and jewelry, cement, petroleum refining, chemicals, and tobacco. Industry is heavily concentrated in Greater Colombo (Colombo and Gampaha

Districts), which includes more than 40 percent of the country's private sector and more than 60 percent of public sector establishments.¹⁰ In 1994 estimated exports were \$3.1 billion,¹¹ of which \$1.2 billion went to the United States. Other major export markets are Germany, United Kingdom, Japan, the Netherlands, and Belgium.¹²

Environmental Conditions

Water quality is among the most serious pollution issues in Sri Lanka. Although reliable water quality data are limited, a detailed study of the Kelani Ganga, the country's second largest river and the major source of potable water for Greater Colombo, indicates that major portions are seriously contaminated with oxygen-consuming pollutants and to a lesser extent with heavy metals. The greatest point source is municipal sewage, accounting for approximately three-quarters of BOD5* loadings to the river, whereas industrial effluents from the twenty or more industries that discharge to the river account for most of the remaining point source pollution. The Mahaweli, Sri Lanka's largest river, is primarily affected by urban wastewater and sediment and agricultural residues.¹³

Use of groundwater, the main source of drinking water for roughly half of Sri Lanka's rural population, is unregulated, resulting in saltwater intrusion due to overpumping in coastal areas and contamination in others.¹⁴

Vehicle pollution is a far more serious concern than industrial air pollution.¹⁵ A study conducted by the National Buildings Research Organization in the early 1990s indicated that Greater Colombo has "hot spots" of suspended particulate matter and lead that pose health concerns primarily attributed to motor vehicles.¹⁶

Environmental Trends

Although it is generally conceded that coastal and inland water pollution, vehicular air pollution, and solid waste conditions have worsened throughout most of Sri Lanka, neither the government nor the research and academic community are carrying out a systematic approach to identify and monitor environmental trends. A comprehensive baseline study of environmental conditions was supported by the U.S. Agency for International Development (USAID) and the Government of Sri Lanka (GOSL) in 1991,¹⁷ but that effort has not been updated. Water quality analyses are conducted on selected water bodies, but these studies have not yielded sufficient data to characterize discernible trends in water quality conditions.¹⁸ Under the World Bank-funded Metropolitan Environmental Improvement Program (see endnote 76), the GOSL is establishing a continuous monitoring program for air quality in the greater Colombo area.¹⁹

3. Government

Sri Lanka's current constitution established a strong president with an appointed prime minister and an elected Parliament. Ethnic problems spurred creation of nine provincial governments, which have taken on increasing responsibilities for environmental management.

* The amount of dissolved oxygen needed or consumed in five days by biological processes that break down the organic matter in an effluent.

Beginning in the early 1980s, Sri Lanka passed several laws designed to integrate environment into its economic development program.²⁰ A coastal zone management program was established that addressed new tourist development as well as coastal erosion issues.²¹ More far-reaching was the National Environmental Act of 1981, which established (a) the Central Environmental Agency, (b) the requirement for EIAs, and (c) with amendments in 1988, a strengthened EIA process and a new environmental protection licensing system, which affected all development-oriented government agencies. The government has been assisted by strong donor interest in environmental programs and institution strengthening,²² yet efficient government management has been frustrated by a lack of rewards and incentives for action and by the large numbers of ministries, subministries, and agencies whose jurisdictions often overlap.²³

Key Ministries for Industrial and Environmental Matters

Ministry of Transportation, Environment, and Women's Affairs (M/TEWA). In conjunction with the Ministry of Policy, Planning, and Implementation, M/TEWA is principally responsible for environmental policy. The ministry was established in 1990. Efforts to strengthen the environmental component of this ministry and its predecessor have been undertaken by USAID and a number of other donor agencies with steady, albeit limited, success.

- The *Central Environmental Authority (CEA)*, placed within M/TEWA, was established by the National Environmental Act in 1980 to be responsible for implementing environmental programs and standards. CEA's effectiveness was hampered by its lack of regulatory authority until 1988 amendments to the National Environmental Act gave it legal authority to issue and enforce the environmental protection licensing scheme as well as oversee EIAs conducted by project-approving agencies. Given its broad duties, CEA lacks sufficient staff and financial resources to meet demands for increased industrial pollution control or engage other agencies in environmental enforcement.²⁴

The *Ministry of Finance, Planning, Ethnic Affairs, and National Integration* is the central economic planning ministry of Sri Lanka. Among its responsibilities, the ministry guides the annual Public Investment Program, which is a mandatory planning document appraising all public investments planned for the next five years.²⁵

- The *National Planning Department* is responsible for preparing the Public Investment Program and appraises the economic and financial viability of all projects submitted to the Cabinet for approval. It has established an informal environmental working group to review the environmental impacts of projects as needed. The National Water Council falls under this department and is the focus of an Asian Development Bank project to develop a strengthened legal and institutional framework for water resource management.²⁶
- The *Urban Development Authority (UDA)* has wide powers to acquire, develop, and dispose of lands and properties and to exercise stringent controls on urban development activities.²⁷ UDA has established industrial estates in various regions of the country by acquiring land for development and selecting industries via a committee comprised of representatives from the Ministry of Industrial Development, Board of Investment, provincial councils, and the Industrial Development Board.²⁸

- The *Board of Infrastructure Investment*, which recently replaced the Secretariat for Infrastructure Development and Investment, has a leading role in infrastructure-financing policies in Sri Lanka and is the counterpart institution for USAID's Promotion of Private Infrastructure Project. In 1993 the secretariat developed guidelines for build-own-operate/build-own-transfer (BOO/BOT) projects to be used by prospective investors and state agencies promoting private financial packages from infrastructure projects.²⁹
- The *Board of Investment (BOI) of Sri Lanka* is responsible for promoting, approving, and assisting foreign investment and is empowered to grant a wide range of incentives to projects in selected sectors. Renamed and expanded in 1992, BOI's objectives are to broaden the economic base of the country and generate economic development, in addition to promoting foreign investment. BOI is also responsible for planning and overseeing industrial development in three export promotion zones and three industrial estates, including environmental oversight and EIA compliance. BOI also has environmental jurisdiction over industries it approves for location outside export promotion zones and industrial estates and has authority for issuance of environmental protection licenses to these industries.³⁰

The *Ministry of Industrial Development (M/ID)* has major responsibility for tracking and promoting industrial development, facilitating private sector growth, providing industrial infrastructure, assisting domestic industry in financing investments, and strengthening regional industrial development strategies. M/ID has the lead responsibility for implementing Sri Lanka's new industrial estate-siting program (see section 4) for polluting industries, a key component of its national industrialization policy.³¹

- The *Industrial Development Board* is responsible for promoting and developing small- and medium-sized industries and has established some of the nation's first industrial estates prior to creation of UDA. These estates are equipped with basic facilities such as water supply, roads, drainage, waste disposal, electricity, and telecommunications.³²
- *Regional Industry Service Committees (RTSCs)* serve as regional extensions of M/ID in planning and promoting industrial expansion at the local level and providing technical assistance to local industries. Efforts are being made to strengthen the committees' ability to develop industrial estates programs effectively in each region. The committees have recently formed committees that include the Industrial Development Board, UDA, and CEA in establishing regional industrial policies, particularly with respect to industrial estates.³³
- The *Fiscal Incentives Committee* oversees implementation of Sri Lanka's fiscal incentives policies to encourage investment in advanced technologies. These incentives apply to (a) technologies that provide new products and services and process raw materials locally that are currently imported in processed form and/or (b) utilize local resources to produce public utilities and infrastructure services. Of particular interest to the U.S. Asia-Environmental Partnership (US-AEP), the committee provides duty and turnover tax waivers for the import of advanced environmental technologies.³⁴

Ministry of Housing, Construction, and Public Utilities. Within this ministry the *National Water Supply and Drainage Board* is the principal agency for developing urban and rural water supply and urban sewerage schemes. It is responsible for removing water from the Kelani Ganga for supplying the Colombo Metropolitan Area and has lead responsibility for monitoring and maintaining sewerage systems in the cities of Colombo and Kataragama.³⁵

Other Key Institutions

Provincial and local governments. Under CEA's industrial classification scheme, all industries that fall in the "low-polluting" category are regulated by local authorities. This includes both licensing under the environmental protection licensing system as well as carrying out enforcement activities. The North Western Provincial Council, which has jurisdiction over Kurunegala, currently has the most autonomy on environmental matters and enacted a Provincial Environmental Act in 1993.³⁶

The *Sri Lanka Standards Institute* sets product standards (most of which are not mandatory), which currently number more than 1,200, for manufactured products, agricultural commodities, industrial raw materials, and production processes. Sri Lanka has adopted the ISO (International Organization for Standardization) 9000 series standards (ISO 9000 to 9004) on quality management and assurance and ISO 10011 standards on environmental management systems; no accreditation program is in place, however, and few firms are certified. At the request of CEA, the institute developed national standards, including tolerance limits on industrial and domestic effluent, air emission norms, noise level criteria, and classification of industries. The institute could play a lead role in ISO 14000, but little interest now exists generally in Sri Lanka in establishing an accreditation/certification program.³⁷

Research institutes. Several government research institutions gather environmental data and provide environmental monitoring services. These include the Agrarian Research and Training Institute, the Central and Regional Agricultural Institutes, and the Rubber Research Institute, among other agriculturally focused entities.³⁸

4. Policies and Laws

Environmental Policies and Laws

A long history of jurisprudence under Dutch, British, and customary law has been enriched since independence, giving Sri Lanka a strong regard for law and its administration by the courts. Sri Lanka's Constitution declares the individual duty to "protect nature and conserve its riches"³⁹; an array of environmental laws has established a strong framework for natural resource and environmental management. The legal framework has, however, required at the central level strong and effective administrative skills and enforcement resources, which have broken down in recent years. Disenchantment with this centralized approach has contributed to liberalization policies. Where resources—whether water, forest, or otherwise—are under pressure, much emphasis has been placed on policy declarations, plans, and attractive incentives that may foster environmental protection.

Sri Lanka developed a National Environmental Action Plan (NEAP) in 1991, which was revised and strengthened in 1994. Of particular relevance to US-AEP is the NEAP's emphasis on combining national economic development and sound environmental management by building environmental considerations into all levels of policy planning to achieve sustainable economic development. The NEAP focuses on clean industrialization, based not only on the long-run costs of disregarding the environment but also on Sri Lanka's shortage of energy resources and the lack of international competitive advantage in polluting industries.⁴⁰

Implementation of environmental policies falls to M/TEWA, a relatively weak ministry within the government. CEA's enforcement capabilities and political weight within the bureaucracy are widely recognized by government, business, and nongovernmental organization (NGO) sectors as being deficient.⁴¹ CEA relies principally on its own agency's resources to conduct monitoring, even though the agency's technical and laboratory capacity is limited. Industry does not generally monitor itself.⁴²

The National Environmental Act does not address the problem of groundwater use, leaving CEA no power to regulate it. CEA relies on the National Water Supply and Drainage Board for technical expertise on groundwater issues, but CEA does not have the authority to regulate groundwater extraction.

Industrial Policies and Laws

Under the government's economic liberalization program, tariffs have been substantially reduced, although some effective rates of protection still exceed 100 percent (e.g., for paper and metal products). External liberalization in manufacturing has been accompanied by internal deregulation and privatization of a large number of state-owned enterprises, causing a decrease in the share of publicly owned, value-added manufacturing from 60 percent in 1981 to 15 percent in 1991. As mentioned in section 3, BOI administers a series of incentives for new and existing manufacturing companies to invest in advanced technologies.⁴³

The government's policies of encouraging private investment and fostering an industrialization program include increased reliance on BOO/BOT arrangements to finance infrastructure projects. The Board of Infrastructure Investment is responsible for all aspects of BOO/BOT project development in coordination with the key policy and implementing ministries; however, privatization of infrastructure has progressed slowly. Most emphasis is on the power sector, although to date no private power projects exist.⁴⁴

The various ministries with important roles to play in economic and environmental policies have historically communicated poorly among themselves. In an attempt to rectify this problem, in the early 1990s the GOSL established an Interministerial Environmental Council consisting of permanent ministry secretaries to coordinate environmental policies with other government policies and plans. This council no longer exists, but the GOSL has recently established a council to review major project proposals, including industrial estates and major industrial facility expansions with respect to their economic and environmental viability. The fifteen-member interministerial council includes CEA, BOI, UDA, M/ID, and the Water Supply and Drainage Board.⁴⁵

In spite of attempts to improve coordination, integration of environmental concerns into industrial policy is currently limited. One promising exception is the GOSL's recent adoption of a policy for siting high-polluting industries on industrial estates (see below).

Public Information Policies and Laws

At present, the only public disclosure requirements in place are for EIAs, which must be made public and available for comment before a project decision pursuant to the National Environmental Act. NGOs have worked effectively with government to ensure that this unusual and highly effective window on government is carefully maintained. Under the new environmental statute pending before the Sri Lanka legislature (see below), public disclosure of environmental information would become a mandatory requirement for government agencies.

Legal and Policy Developments of Particular Relevance to Industrial and Urban Environmental Management

Industrial siting policy. In 1994 the Cabinet adopted a policy requiring that all new industries that are classified as high polluting (as defined by CEA) be located on industrial estates. In addition, all new industries classified by CEA as “high polluting” must be located on industrial estates if they generate large quantities of solid and liquid wastes. M/ID is implementing this policy and recently initiated a program to foster development of industrial estates throughout the country. With the assistance of the USAID mission’s *Natural Resources and Environmental Policy Project* (NAREPP) (see endnote 75), M/ID has assessed a number of candidate sites and is developing industrial estate siting and development policies and practices.⁴⁶

Industrial pretreatment plans. Under World Bank funding (see section 9), Sri Lanka plans to construct common wastewater treatment facilities under BOO/BOT arrangements for two industrial zones near the metropolitan Colombo area—Ekala-Jaela and Moratuwa/Ratmalana. To minimize the uncertainties for private investors, CEA is requiring existing industries in these zones to declare by early 1997 whether they will comply with the agency’s effluent standards by installing their own pollution controls or by committing to a pretreatment program and paying for treatment of their effluents by the central facilities.⁴⁷

Amendments to the National Environmental Act. The Cabinet is currently reviewing a draft bill that would essentially replace the National Environmental Act with sweeping new legislation that would fundamentally change the framework of the Sri Lankan environmental policy regime. Although the prospects for enactment by the legislature are uncertain at this time, the law, if passed, would have major implications for Sri Lanka’s approach to environmental management.⁴⁸

5. Urban Environment and Infrastructure

Although Sri Lanka’s urban areas are not growing as rapidly as in most other countries in the region, cities and municipalities are facing severe environmental problems. Sri Lanka has no effective zoning process; residential areas have tended to develop around industrial sites. In recent years, this development has resulted in a proliferation of public nuisance suits.⁴⁹ Urban environmental problems are further exacerbated by a critical shortage of environmental infrastructure.

Following is an overview of some of the country’s most pressing environmental infrastructure needs:

Water Supply

According to the National Water Supply and Drainage Board, about 53 percent of Sri Lanka's population is served by "safe" drinking water facilities (which includes protected dug wells, tube wells, and treated piped water systems). For urban areas, the figure is 87 percent. In spite of the classification of its water supply as "safe," the Greater Colombo Water Supply System is plagued by the occurrence of bacterial contamination due to inadequate chlorination and inflow of polluted water from the Kalani River.⁵⁰

Wastewater

Only two cities in Sri Lanka—Colombo and Kalaragama—have sewer systems. The Colombo system serves only about 482,000 people, whereas other residents rely on on-site disposal. It is estimated that about 15 percent of the total population of the Colombo urban area have no sanitation facilities at all.⁵¹

Sri Lanka has no municipal wastewater treatment facilities. The only wastewater treatment facilities currently being contemplated are for the town of Kotte, which, in conjunction with UDA, the National Water Supply and Drainage Board, and CEA, is seriously examining development of a municipal wastewater treatment system under a BOO or BOT arrangement.⁵²

Solid Waste

Currently, regular solid waste collection systems exist only in Greater Colombo, that is, in Dehiwala–Mt. Lavinia, Moratuwa, and Kotte. In the Colombo Metropolitan Area, about 70 percent of the total municipal solid waste is systematically collected; solid wastes are typically dumped at a large number of unprotected sites. Under the World Bank's Colombo Environmental Improvement Project, this situation should be dramatically improved with construction of a sanitary landfill in Welisara to service the Colombo Metropolitan Area.⁵³

Hazardous Waste

The GOSL does not currently have an enforceable framework for classifying solid waste as hazardous or for regulating hazardous waste management; hence, no infrastructure exists for managing hazardous waste.

6. Private Sector and Academia

Industry

With the high cost of capital (currently in the mid-20 percent range), Sri Lankan industries are having a difficult time obtaining financing for new investment. This issue, combined with the fact that investment in environmental equipment is generally viewed as nonproductive, has resulted in a low level of environmental expenditures. In general, industries in Sri Lanka view environmental concerns as imposed by CEA; the notion that good environmental management is important to competitiveness has not been widely accepted.⁵⁴ Environmental considerations are usually made in a reactive mode, for example, in response to an enforcement action, and typically involve adding end-of-pipe "quick fixes" that do not consider the potential for clean production.⁵⁵

Given this situation, industry has little interest in ISO 14000; a recent survey found that less than 15 percent of the industries surveyed had even heard of ISO 14000.⁵⁶ The two largest business organizations in Sri Lanka, however, described below, have recently become seriously engaged in environmental matters.

- *Federation of Chambers of Commerce and Industry of Sri Lanka.* The federation and (see below) Ceylon Chamber of Commerce have the greatest breadth of contact with Sri Lankan industries. Since 1995 the federation has worked closely with CEA and M/ID to heighten industry awareness of environmental concerns and of industries' obligations under Sri Lanka's laws and standards, including workshops and training programs.⁵⁷
- *Ceylon Chamber of Commerce.* With the assistance of USAID's NAREPP project, the chamber has established an environmental unit that will act as an information clearinghouse on environmental issues for the private sector. Events during its first year of operation have included a workshop for local environmental consultants, an industry survey of environmental concerns, and formation of an environmental task force (including industry, NGOs, and CEA). The chamber's environmental activities are focused on representing private sector interests in national environmental policy and on providing guidance to industry on environmental regulations, environmental business opportunities, and clean technologies.⁵⁸

Other private sector environmental initiatives in Sri Lanka include the following:

- *ITMIN* is a new private sector venture, launched in December 1994 to serve as an information broker on innovative technologies. Startup funds have been provided by the United Nations Development Programme but with the express objective of leveraging these funds to establish a self-supporting venture. ITMIN currently has a mix of government and private shareholders, including the Ceylon Institute of Scientific and Industrial Research. ITMIN manages *CleaNet*, an initiative funded by the World Bank to provide an online clearinghouse of specialized information on environmental technologies, including assistance available locally and internationally. It has recently become operational and provides information on environmental technologies developed and used in Asia.⁵⁹
- *Environmental engineering and consulting.* The number of environmental firms serving industrial needs is small. CEA maintains a list of environmental companies but does not evaluate these firms on the basis of performance. These firms are typically small and not aligned with major, internationally recognized environmental engineering firms. The only in-country presence of the large firms is through project offices under donor assistance programs.⁶⁰

Academic and Research Institutions

Given the limited capacity of environmental companies, academic and research institutions do much of the environmental monitoring and pollution control technology evaluation for Sri Lankan industry.

The *Ceylon Institute of Scientific and Industrial Research* is a quasi-governmental research organization, partially financed by government funding and revenues generated from consulting. The institute's board of directors is appointed by the minister of science and technology. The institute plays a leading role in the United Nations Industrial Development Organisation's industrial waste minimization program and is accredited to certify laboratories under ISO standards.

Many *university departments* target environmental research on specific issues and offer master of science courses in environmental subjects, including the University of Colombo (environmental sciences), PGIA/University of Peradeniya (environmental economics and natural resource management programs), University of Kelaniya (environmental chemistry and resource management), University of Sri Jayawardenepura (forestry), and University of Moratuwa (environmental engineering, environmental planning, and town and country planning).

Universities also play major roles in private sector consulting, particularly in monitoring, assessment of treatment technologies, and provision of turnkey packages, in partnership with private engineering companies for wastewater treatment facilities.⁶¹ Moratuwa, for example, conducts extensive consulting services to private companies, particularly in designing wastewater treatment facilities and conducting effluent and ambient water quality monitoring.⁶²

Center for Environmental Studies. Founded in 1992 at Peradeniya University, the center promotes programs in environmental education, research, and consultancy. The center also conducts regular training workshops on EIAs for state, private sector, and NGO officials and has just announced a year-long postgraduate course on EIA beginning August 1996. The course will cover concepts and definitions, evolution of environmental policy, EIA process in Sri Lanka, ecological foundations, socioeconomic dimensions, techniques in environmental assessment, project planning, and case studies.⁶³

The *National Building Research Organization*, part of UDA, is a research and development entity concerned with the built (housing and construction) environment. The Environmental Division carries out industrial pollution surveys and monitoring as well as monitoring the quality of air and surface and drinking water. Industrial estate sitings and solid waste disposal surveys and planning recommendations are also provided by the division.⁶⁴

Financial and Insurance Institutions

Commercial banks. Sri Lanka's banking sector suffers from a lack of competition and financial innovation. Although more than twenty commercial banks exist, competitive forces are weakened by the two state-owned commercial banks, which control about 60 percent of the sector's assets. In addition, the foreign banking sector has declined in importance since its years of rapid expansion in 1979-82.⁶⁵

Development finance institutes. The two private development finance institutes are the National Development Bank and the Development Finance Company of Ceylon. The latter has an environmental unit with two environmental engineers, who are responsible for reviewing the environmental impacts of every project applying for loans. Although environmental aspects of proposed projects is a major concern,

the Development Finance Company of Ceylon does not actively promote clean technologies or “innovative technologies,” opting instead for conventional technologies, which are viewed as having lower risks.⁶⁶

The *Pollution Control and Abatement Fund* provides assistance to industries to encourage investment in pollution technologies. Funds are available through the National Development Bank, Development Finance Company of Ceylon, Sampath Bank, Hatton National Bank, and Commercial Bank for matching grants for pollution prevention audits and investment loans for implementation of audit findings. The loan program has not been used extensively by industry, primarily because it is not very concessional.⁶⁷

7. Environmental Awareness and Public Involvement

General Public Awareness of Environmental Issues

The general public is keenly aware of environmental issues. In 1993 Survey Research Lanka conducted an environmental awareness survey for USAID’s NAREPP project. It showed that, nationwide, environmental problems ranked fifth among economic and social problems, but first among *local community* problems for both urban and rural adults.⁶⁸

Citizen groups have been active in recent years in taking industries to court. In fact, more companies have been shut down by citizen suits than by CEA enforcement actions.⁶⁹

Nongovernmental Organizations

Sri Lanka has a large number of NGOs that are active in the environment on the national and local levels. The following represent some of the key, nationally focused NGOs:

- *EMACE Foundation*. This environmental NGO uses a community-based approach in its work with industry, schools, Colombo slums, and village groups. EMACE provides waste treatment training, consultancy contacts, and information on cost-saving waste/pollution minimization techniques.
- The *Environment Foundation*’s primary focus areas are environmental law, legal advocacy, natural resource rights, research, and an environmental law education program for magistrates and others. Foundation lawyers and scientists have worked on environmental cases in areas such as EIAs for proposed development, public trust, river gem mining, highway expansion through wetlands, and stone quarry blast damage.⁷⁰
- The *March for Conservation* promotes nature conservation education and public awareness, prepares environmental education materials, conducts research and teacher training, and is staffed mainly by scientists.⁷¹
- The *Sri Lanka Environmental Journalists Forum* specializes in communications aspects of environmental issues and provides environmental awareness through the mass media.⁷²

- *The Asia Foundation.* Although not an indigenous organization, since 1991, the foundation has worked under a cooperative agreement with USAID's NAREPP program to assist NGOs in raising public awareness of environmental issues. The foundation has assisted dozens of environmental NGOs through grants designed to strengthen the overall programs of NGOs or target specific projects.⁷³

8. U.S. Government Activities

U.S. assistance has totaled over \$1.3 billion since Sri Lanka's independence in 1948. In 1994 the United States delivered about \$55 million in aid, including \$25 million for free wheat, \$18 million in low-interest loans for additional wheat, and about \$12 million in other direct assistance activities. The United States is the second largest bilateral donor behind Japan and the fifth largest donor overall.⁷⁴

USAID projects of particular relevance to US-AEP include NAREPP, the Shared Control of Resources Project, Agro-Enterprise Project, Technology Initiative for the Private Sector, and Promotion of Private Infrastructure.⁷⁵

US-AEP Activities in Sri Lanka

US-AEP has supported 61 environmental exchanges, has processed 31 trade leads, and has sponsored 2 technology grants through the National Association of State Development Agencies. With the U.S. Environmental Protection Agency, US-AEP has supported one environmental action team.

9. Other Bilateral and Multilateral Organization Activities

Sri Lanka depends greatly on foreign assistance and has received approximately \$500 million per year from donors since 1990. The Asian Development Bank and World Bank are the largest major sources of project lending. In addition, the U.N. Industrial Development Organisation (UNIDO) supports an industrial pollution reduction program. Information on relevant projects of these three organizations is provided in the endnotes.⁷⁶

10. Opportunities to Support Clean Production and Environmental Management

Policy Framework

Environmental law. The major amendments to the National Environmental Act currently under consideration by the GOSL will, if enacted, provide CEA with significant new authority as well as substantial demands. If the amendments are passed, CEA as well as other agencies will need assistance in implementing a wide range of policy mandates in the act as well as developing air and water quality implementation plans at the national and provincial levels.

Public information. Although public reporting of environmental information is currently limited, the government has gained a fair amount of experience in dealing with the public through the EIA process. Enactment of the amendments mentioned above would dramatically expand the government's responsibilities to conduct public disclosure programs and provides an opportunity for donor assistance in improving the quality and management of information on environmental conditions and industrial environmental performance.

Incentives for investment in clean technologies. BOI criteria for providing financial incentives for technology investments do not currently address environmental considerations; however, the board is currently considering a policy revision that would require investors to report on the amount of their proposed investment dedicated to pollution abatement equipment. In addition, BOI staff have expressed an interest in learning more about additional incentives that could be provided for investments in clean technology.

Professional society. An environmental professional association, providing a forum for public, private sector, and NGO professionals to exchange their experiences and technical information, is both critically needed and in strong demand in Sri Lanka. Support by U.S. environmental professional societies and associations in establishing counterpart organizations in Sri Lanka would make a substantial contribution to strengthening the country's environmental regime.

Industrial Environmental Management

Industry outreach. The environmental initiatives of the Ceylon Chamber of Commerce and the Federation of Chambers of Commerce and Industry of Sri Lanka provide important forums for reaching a large segment of Sri Lankan industry and engaging industry leaders in an expanded dialogue on environmental issues, such as the importance of ISO 14000 and environmental concerns in the global marketplace. This could include, for example, exchanges between staff in environmental units in the Sri Lankan chambers and in U.S. counterpart organizations.

Technology transfer. The environmental information data bases and clearinghouses managed by ITMIN, including *CleaNet*, may be important vehicles in providing information to Sri Lankan industries on environmental technologies and clean production processes.

Environmental Infrastructure

Privatization. Privatization of environmental infrastructure is at a rudimentary stage in Sri Lanka and to date has been largely limited to a handful of projects, such as wastewater treatment facilities for the two industrial estates discussed above. Provision of a significant amount of privately financed infrastructure to meet Sri Lanka's pressing urban environmental needs is not likely to occur in the near future. The central and provincial governments and municipalities have a major need for training and technical assistance in implementing successful privatization projects.

Industrial estates. Sri Lanka's policy of requiring high-polluting industries to locate in industrial estates managed by M/ID provides a potentially important venue for donors to work with M/ID in the areas of policy and technology transfer. Policy issues include industrial wastewater pretreatment policies, solid and hazardous waste management policies, and charge schemes that incorporate the "polluter pays" principle.

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Endnotes

1. Civil unrest has prevented any census since 1981.
2. These projections are based on assumptions constructed in 1988 and based on assumptions concerning fertility, mortality, and migration. See Baldwin (1991, 24).
3. Premadasa (1992).
4. Baldwin (1991, 29).
5. Sri Lanka's population is roughly 75 percent Sinhala, largely Buddhist; 12 percent Tamil, Hindu, and Christian; and the remainder descended from the Moors, being Moslem. Approximately 5 percent of the population is Christian. In 1956 the government declared that Sinhala was the official language.
6. Baldwin (1991, 56).
7. Military expenditures by the government and effects of civil disturbances on tourism and new investment have been a continuing drain on the economy. The insurrection led by the Tamil Tigers in the north and east of Sri Lanka, which began in 1983, has continued, although the city of Jaffna was taken by government forces in 1996. The insurrection in the south in 1988 by an extremist element of the Sinhala population opposed to the government-invited Indian army occupation of the north ended by 1990.
8. Environmental Business International (1996).
9. Baldwin (1991, 74–75). Electricity provides 40 percent of commercial energy in Sri Lanka, but because Sri Lanka lacks any fossil fuel resources, biomass provides 70 percent of the country's total household and commercial energy supply.
10. From information collected during US-AEP country visit by John W. Butler and John J. Mapes (June 17–21, 1996); IIED (1992).
11. Leading industrial exports in 1993 were:

Textiles and garments	\$1.41 billion
Tea	\$413 million
Petroleum products	\$79 million
Gems	\$76 million
Rubber	\$64 million
Coconuts	\$58 million

(Review Publishing 1995).
12. U.S. Department of State (1995a).
13. Baldwin (1991, 166–67).
14. Groundwater studies performed in the northern and northwestern coastal areas have found nitrate and bacterial contamination (Baldwin 1991, 169).
15. Problems are highly local, such as areas near cement plants. See IIED (1992, 89).
16. Sulfur oxides in the Colombo area are also attributed to motor vehicles, due to the presence of sulfur in diesel fuels (information collected during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996]).

Endnotes

17. See Baldwin (1991). This document, to which more than a dozen Sri Lankan experts contributed, was Sri Lanka's first comprehensive natural resource conditions and trends report.
18. Examples are the ongoing water quality study by the University of Moratuwa under the sponsorship of the Central Environment Authority and water quality monitoring along the reach of the Mahaweli River basin under the jurisdiction of the Mahaweli Water Authority (information collected during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996]).
19. Under this program, called "Clean Air 2000," a network to monitor suspended particulate matter, SO_x, NO_x, and lead will be established (information collected during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996]).
20. The Coast Conservation Act of 1981, the National Aquatic Resources Act of 1981, the National Heritage and Wilderness Act of 1987, and the National Environmental Act of 1980, as amended in 1988 (Baldwin 1991, 7).
21. Baldwin (1991, 238).
22. Donor support for government, including but not limited to environmental assistance, has been substantial in Sri Lanka, growing to nearly half of its gross domestic investment by 1990 (Baldwin 1991, 61).
23. Baldwin (1991, 8).
24. IIED (1992); Sri Lanka (1980 and 1994c).
25. The GOSL's economic and fiscal policies and investments in the public sector are documented in the annual Public Investment Program (PIP). Public resources are allocated by providing an estimate of total public investment over a five-year period beginning with the year of publication. The first year generally reflects actual budgetary allocations approved by Parliament or the Core Investment Plan (CIP). New projects are included in the PIP after review by the National Planning Department, but even priority projects may be dropped in subsequent years if the funds are not available. The PIP attempts to take into account existing environmental concerns. Some attention is given to sectoral environmental concerns, but this is restricted to general references to the National Environmental Action Plan (NEAP) and pollution concerns.

The 1995 PIP shows that 10 percent of the investment addresses NEAP concerns, whereas the 1996 PIP has a 12 percent level. The CIP provides for rates of investment of 12 percent and 15 percent respectively. The urban and industrial sector of the NEAP has the largest amount of the PIP/CIP's NEAP investment with the 1995 CIP allocation of 8.1 percent and the 1996 level of 11.4 percent. The PIP levels of investment for the same years are 5.7 percent and 8.5 percent respectively. It should be noted that approximately 85 percent of these investments address urban infrastructure deficiencies, such as water supply and sanitation and canal rehabilitation for Greater Colombo (information in text and this endnote is abstracted from Sri Lanka [1994c] and Norconsult Engineering Consultants [1994]).

26. The National Planning Department acts as the secretariat to the GOSL's Committee of Secretaries, which is an administrative arrangement that unites the secretaries of all the ministries on a regular basis to determine which government projects are ready to present to the Cabinet for approval and to coordinate government proposals and functions. The National Planning Depart-

ment provides economic and conformity analyses of financial feasibility and government policy and strategy for projects that the committee discusses (information in text and this endnote abstracted during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996] and from de Silva [1993, 19]).

27. UDA has jurisdiction over 11 municipal councils, 35 urban councils, 46 local authorities, the Tricomalee district in Eastern Sri Lanka, and local authorities within a 1-kilometer-wide belt along the coast.
28. The functions of UDA include (a) carrying out integrated planning and physical development within and among the designated development areas, (b) formulating and implementing an urban land use policy, (c) developing environmental standards and preparing schemes for environmental improvements in the development areas, (d) formulating and executing housing schemes, and (e) clearing slum and shanty areas and undertaking the development of such areas (information in text and this endnote abstracted from World Bank 1995b).
29. USAID (1995c); Sri Lanka (1993).
30. Raw materials and essential plant, machinery, and equipment can be imported into export promotion zones duty free, provided that the resulting products are exported. BOI controls all infrastructural and environmental aspects within these areas. BOI's duties include management and operation of pollution control systems and control of the regulations imposed on industries regarding disposal of their wastes. Individual industries that locate in BOI export promotion zones do not have to conduct an EIA for the proposed activity, provided it is consistent with development assumptions used in developing the EIA prepared for the zone. BOI also plays a role in planning and managing industrial development in the entire country and in siting new industries.

BOI law dictates incentives that vary according to sector categories but may include profit/dividend tax exemptions; exemption from import duty, turnover tax, and excise duty; tax holidays and exemption from capital gains taxes resulting from a transfer of shares; exemption from the exchange control act; and so on. BOI categorizes investments as follows:

- Manufacturing projects using higher technology
- Service projects using higher technology
- Investments in large-scale development projects, including infrastructure
- Small-scale infrastructure projects
- Tourism, recreation, and leisure projects
- Agricultural sector products
- Dairy and livestock development projects
- Institutions providing training facilities
- Projects not satisfying export orientation and/or investment criteria using higher technology (these are referred to M/ID's Fiscal Incentive Committee to obtain applicable incentives).

(Information in text and this endnote abstracted during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996]; USAID 1995b; Sri Lanka 1996.)

31. From information collected during US-AEP country visit by John W. Butler and John J. Mapes (June 17–21, 1996); USAID 1995a.

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32. USAID (1995a).
33. From information collected during US-AEP country visit by John W. Butler and John J. Mapes (June 17–21, 1996); USAID (1995a).
34. Concessions include five-year tax holidays, exemptions of dividends paid out of tax-exempt profits, and import duty and turnover tax waivers depending on eligibility. Advanced environmental technology is defined as that which introduces a new design, formula, or process in the manufacture of an article or in provision of a service resulting in one or more of the following: higher productivity resulting from lower cost production, quality improvement, efficient utilization of raw materials, upgraded technical skills, and environmental pollution/waste minimization (text and this endnote abstracted from USAID [N.d.]).
35. It administers 216 water supply systems nationwide, serving about 4.8 million people. Operational management is decentralized to five regional offices, which monitor district offices. Although the board does not regulate groundwater use, it does provide technical advice to CEA on groundwater issues (information collected during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996]; World Bank 1995b).
36. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
37. U.S. Department of State (1995b).
38. Sri Lanka (1994c).
39. Article 28 of the Constitution (Baldwin 1991, 7).
40. The 1992–96 National Environmental Action Plan (NEAP) was Sri Lanka's first comprehensive, time-phased environmental planning document and one of the first of its kind in the world. The 1992–96 NEAP included both corrective and preventive measures for the following sectors: land, water, mineral, and coastal resources; forestry; biodiversity and wildlife; urban pollution; industrial pollution; energy; environmental education; culture; and institutional capacity. Principal environmental issues were identified for each sector, followed by tables describing the background, recommended actions, implementing priorities, cost, and implementing agencies for each sector issue (Sri Lanka 1991).

The 1995–98 NEAP further distilled the original sectors into program areas: land and water resources; forests and biodiversity; urban and industrial pollution; coastal and marine resources; energy and mineral resources; economic-environmental linkages; and policy, institutions, education, and culture. Recognizing that everything cannot be accomplished within this four-year period, the 1995–98 NEAP confines itself to focusing on environmental policy and institutions development, sustainable agriculture, improved water management, and pollution prevention and control for new industries. With respect to industrial and urban pollution and wastewater management, the NEAP addresses several issues and actions to be taken during the 1995–98 period (Sri Lanka 1994b):

- *Inefficient solid waste management in the Colombo Metropolitan Area.* Introduce self-employment schemes and cooperatives for primary collection. Introduce private sector operation of sanitary landfills, fostering BOO/BOT. Introduce private sector operations for clinical waste and composting. Formulate a long-term solid waste management strategy for the metropolitan area.

- *Lack of wastewater management in the two major urban areas (Ratmalana/Moratuwa and Ekala/Jaela).* Adopt a “polluter pays” policy. Provide education on chemical recovery recycling, environmentally friendly processes and inputs, and good housekeeping to reduce quantity of water needing treatment, which will reduce the cost of production. Specify in-house pretreatment standards for facilities at the factory level. Construct a wastewater network. Set up central treatment plants through BOO/BOT. Enforce specified discharge standards. Provide a domestic sewage disposal system in each area.
- *Lack of pollution control in the Beira Lake catchment area.* Adopt policy that beneficiaries of services “must pay.” Stop discharge of sewage and effluents into Beira Lake. Intercept illegal sewer connections and link them to the Colombo sewer network. Mobilize private sector investment for Beira Lake resource development. Strengthen the enforcement capacity of CEA. Regulate manufacturing and other activities on the shoreline.
- *Improvements needed in the physical, social, and economic conditions of nearly 18,000 families, involving 185,000 people in settlements in Colombo Metropolitan Area.* Integrate social, economic, and physical components for community mobilization and capacity building. Provide infrastructure services and organize community-based organizations and user groups to manage and maintain infrastructure and community facilities. Offer land title to qualified applicants. Provide facilities, loans, and so on for self-employment, small businesses, and income generation. Provide logistical support to implementing agencies.
- *Industries discharging sewage and other noxious substances to the environment, in particular, water bodies.* Establish additional industrial estates with self-contained waste processing and disposal facilities. Provide incentive to investors to locate their manufacturing industries on these estates. Monitor and control all industrial activities that result in the disposal of waste substances.

Note: 85 percent of these activities are being addressed via the World Bank’s Colombo Environmental Improvement Project and Metropolitan Environmental Improvement Project. (Sri Lanka 1995).

41. The National Environmental Act mandated the development of standards, studies, and educational programs and local-level environmental programs through the appointment of district environmental agencies by CEA. District-level administration has been discarded since then, however, in favor of provincial governments; this potentially effective local tool has not been replaced. CEA’s effluent standards were also largely drawn from World Health Organization guidelines and not tailored to Sri Lankan industries.

With the 1988 amendments, the environmental protection licensing and EIA systems are CEA’s principal mechanisms for monitoring and enforcing compliance with environmental standards. The 1988 amendment introduced new air, water, and land pollution standards. The Sri Lanka Standards Institute is charged with setting pollution standards. Industries, both public and private, must obtain an environmental protection license from CEA indicating conformity to pollution standards.

The 1988 amendment also nominated fifteen project-approving agencies, a combination of ministries and agencies with environmental units that must obtain EIAs from any developer (public and private). EIAs must be made available to the public for review and comment.

With respect to the two major implementation tools at CEA's disposal:

- *Environmental protection licensing.* Introduced in 1990, environmental protection licensing is required for existing industries and includes conditions requiring that industries control their effluent to an agreed level within a specified period. Industries are essentially granted permits to discharge any type of liquid, solid, or gaseous waste into the environment according to standards established by CEA for each industry. Industries are also classified as low, medium, and high polluting, taking into consideration the manufacturing process, raw materials used, and pollution characteristics. CEA delegated to local authorities the issuance of environmental protection licensing to low-polluting industries in January 1994 to relieve some of the regulatory burden. The banking system is also allowed to provide a preliminary pollution classification for all potential investors (Sri Lanka 1991 and 1994c).
 - *Environmental impact assessments.* In 1993 EIAs became a statutory requirement for all proposed, potentially polluting industrial ventures and is enforced by CEA. Under the regulation, an initial environmental examination or EIA report will have to be submitted to one or more of the fifteen appropriate project-approving agencies as a condition of project clearance. All industrial estates exceeding 10 hectares are required to undergo an EIA (Sri Lanka 1991). CEA relies principally on its own agency's resources to conduct monitoring, even though the agency's technical and laboratory capacity is limited. Industry does not generally monitor itself.⁴
42. From information collected during country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
43. Sri Lanka (1996); WTO (1995).
44. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
45. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
46. From information collected during country visit by John W. Butler and John J. Mapes [June 17–21, 1996].
47. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
48. Among other things, the draft bill (Sri Lanka N.d.):
- Charges M/TEWA with assessing environmental trends and preparing annual state of the environment reports
 - Establishes an interministerial National Coordinating Committee on Sustainable Development
 - Requires CEA to establish national ambient air quality standards and a national action plan to achieve the standards and requires provincial councils to prepare implementation plans
 - Requires CEA to prepare a national action plan for maintenance of water quality and requires provincial councils to prepare implementation plans
 - Requires CEA to establish ambient noise standards

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- Requires CEA to establish a hazardous waste regulatory program
 - Strengthens the Environmental Protection License and Environmental Impact Assessment systems, providing CEA with stronger enforcement authority
 - Establishes a public right to access to environmental information.
49. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
 50. Information supplied by National Water Supply and Drainage Board during US-AEP country visit. Also, see Sri Lanka (1994a, 2).
 51. Sri Lanka (1994a, 21).
 52. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
 53. Sri Lanka (1994a, 18–19).
 54. One industry association director expressed his view to the US-AEP assessment team that because the government is making industry install pollution control, the government should pay for it (information from US AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.)
 55. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
 56. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
 57. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
 58. From information collected during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996] and from USAID [1995b]. Highlights of preliminary results of the Ceylon Chamber of Commerce's (1996) industry survey are provided below:
 - The majority of respondents were not aware of or had difficulty understanding laws and regulations with which they must comply.
 - Most respondents who understand laws and regulations find it difficult to comply and to obtain assistance from relevant agencies to do so.
 - Access to appropriate technology and funds to resolve environmental problems were cited as major barriers.
 - Slightly more than half of the respondents are familiar or have personal experience with EIAs, environmental protection licensing, CEA, waste treatment technologies, and waste minimization, whereas a minority were familiar with the Draft Environmental Protection Act and ISO 14000.
 59. The purpose of *CleaNet* is to provide a full-service center for assistance to private sector industrial units. Assistance to clients will include identifying the most cost-effective option for meeting environmental regulations and improving production efficiency through the following services: clearinghouse and information brokering, networking and training, facilitating pollution preven-

Endnotes

- tion through audits, and eventually promoting waste exchange among industrial units (information in text and this endnote abstracted from information collected during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996] and USAID [N.d.]).
60. A recent publication prepared by the GOSL and Ceylon Chamber of Commerce lists twenty-six Sri Lankan firms that offer expertise in areas such as wastewater treatment, biotechnology for wastewater, waste treatment plant design, waste audits, solid waste management, EIA preparation, environmental engineering, and design of effluent treatment systems (information in text and this endnote abstracted from information collected during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996] and from USAID [N.d.]).
 61. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
 62. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
 63. USAID (N.d.).
 64. Sri Lanka (1994b).
 65. World Bank (1995a).
 66. From information collected during US-AEP country visit by John W. Butler and John J. Mapes (June 17–21, 1996); World Bank (1995a).
 67. From information collected during US-AEP country visit by John W. Butler and John J. Mapes (June 17–21, 1996; USAID (N.d.)).
 68. Statements such as “the average person has more important problems with which to cope than those affecting his/her environment” and “most people do not appreciate the benefits of a clean environment” were greeted affirmatively for 87 percent and 56 percent respectively of the population surveyed. Sixty percent of the sample population is aware of environmental deterioration; more than 80 percent identified water pollution, solid waste/garbage, deforestation, and health-related environmental problems as those currently facing Sri Lanka. Of the problems cited by the population, 90 percent ranked health-related environmental problems as the most critical, followed by water. About 60 percent of the population is familiar with CEA, whereas a mere 33 percent have heard of the National Environmental Act. In general, the population does not believe that individuals can effect environmental improvement and believe that public institutions are better equipped to do so. Press, television, and radio were the major sources of environmental information for both the urban and rural populations (Survey Research Lanka 1993).
 69. From information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996.
 70. IIED (1992).
 71. IIED (1992).
 72. The Asia Foundation (1994).
 73. The Asia Foundation (1994).

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74. U.S. Department of State (1995a).
75. *Natural Resources and Environmental Policy Project* (NAREPP) is a cooperative effort with the M/TEWA that seeks to improve environmental policy development. NAREPP serves as the umbrella project for USAID's environmental assistance in Sri Lanka. NAREPP's main project component is environmental policy and institution development. Its scope also includes biodiversity, urban and industrial environmental management, coastal resource management, and public participation in environmental management.

Shared Control of Resources is a subproject and the first effort ever to focus attention on the watershed as the basic unit of planning and implementation for the local use of resources. Through this subproject, USAID is empowering local people to increase their control over natural resources in selected watersheds. This activity will provide for field testing and development of the sustainable use of natural resources.

Technology Initiative for the Private Sector helps companies choose, acquire, and master new technologies to improve their international competitiveness. It provides cost-sharing grants on a 50/50 basis for investment in clean technologies and pollution control equipment, purchase of pollution control equipment, participation in trade fairs and meeting technology suppliers, and hiring environmental consultants. Information on new technologies and suppliers of U.S. pollution control equipment is also provided.

Agro-Enterprise Project provides technical/financial assistance to agricultural enterprises. Cost-sharing grants (up to 50 percent of expenses) are available for investments in pilot treatment systems and clean technologies, participation in environmental technology trade fairs or technology evaluation missions, and hiring environmental consultants. Information on U.S. technologies is also available through its Business Center..

Promotion of Private Infrastructure has played a major role in Sri Lanka's infrastructure privatization policies, including establishing an institutional structure within the Secretariat for Infrastructure Development Investment, now known as the Board of Infrastructure Investment, and developing regulations and procedures for soliciting, receiving, and negotiating private sector infrastructure projects under BOO/BOT arrangements..

76. The following are major multilateral-supported projects of particular relevance to industrial and urban environmental management:

World Bank

Environmental Action I Plan 1996–2001 (EAIP). This represents the 1995–98 implementation phase of the NEAP. Priorities of the project are to (a) strengthen the institutional framework, (b) address policy reform needs, (c) support operations of an urgent nature (investment subprojects), and (d) support studies that are potentially relevant for understanding the implications of economic policy for resource management. Under the EAIP program, M/TEWA plans to strengthen its environmental protection licensing scheme and rationalize the current set of effluent standards by making them more industry-specific, more directly relevant to Sri Lankan industry, and based on loadings rather than the current concentration-based standards. Greater use of contracting services (e.g., for conducting facility inspections) is also under consideration (information collected during US-AEP country visit by John W. Butler and John J. Mapes [June 17–21, 1996]; Sri Lanka [1994c]).

Metropolitan Environmental Improvement Programme (MEIP). Supported in conjunction with the U.N. Development Programme, the project began in 1990. MEIP in Colombo was designed with the primary objective of first creating the strategic (policy and institutional) framework that could then be followed by investment actions for physical remedial measures for environmental cleanup of the greater Colombo area. One of the major products of the program of direct relevance to US-AEP is completion of a comprehensive characterization of hazardous wastes generated by industries along the western corridor of the country, including an assessment of hazardous waste, biohazardous wastes, and waste oils for nearly 90 percent of Sri Lankan industries. With the MEIP project for Colombo nearly completed, and with the start-up of the CEIP, the World Bank is negotiating with GOSL for urban environmental assistance in the cities of Galle and Kandy. These projects are envisioned to address municipal wastewater and solid waste, and community-based environmental management.

Colombo Environmental Improvement Project (CEIP). Based on work completed under MEIP, CEIP will include the following components: clean settlements, construction of a 1,000-ton-per-day sanitary landfill to service the Greater Metro Colombo region; hospital waste management, including a treatment/disposal facility; strengthening the institutional capacity of solid waste authorities in and around Colombo; central wastewater treatment facilities for two existing industrial zones (Ekala-Jaela and Ratmalana); financing under BOO/BOT arrangements; and implementation of the Beira Lake cleanup program, including sewer connections for sources now discharging into the lake (information collected during US-AEP country visit by John W. Butler and John J. Mapes, June 17–21, 1996).

Private Finance Development Project. The \$4 million Pollution Control Abatement Fund was created through this project to provide low-interest loans to existing industries to finance investments in waste minimization and end-of-pipe treatment. The project is also responsible for the development of *CleaNet* via its Pollution Control Abatement Fund component (Patchamuthu and Walton N.d.).

Private Sector Infrastructure Development Project. The main objective of the project is to create the Private Sector Infrastructure Development Company to facilitate private sector implementation of commercially viable, high-priority infrastructure projects by improving access to a source of long-term financing. The company would be public with the GOSL as the major shareholder (World Bank 1996).

Asian Development Bank

Sri Lankan Urban Development Project. This project's objectives are to implement infrastructure development programs in several medium- to small-sized urban areas; strengthen urban sector policies, including those related to creation of urban growth centers; and provide on-the-job training to counterpart staff (UDA/MPPI) and community-based organization representatives. The infrastructure component is related mainly to environmental improvements such as water supply, sanitation, drainage, and solid waste management (Norconsult and Engineering Consultants 1994).

Institution Strengthening for Comprehensive Water Resource Management. The scope of the grant includes a core program to implement the Action Plan for Comprehensive Water Resource Management, which encompasses relevant agencies, water users, and other stakeholders under the National Water Council. The council will install an improved and legally enacted institutional

framework for water sector operations during a three-year period. The National Planning Department is the executing agency.

Private Sector Infrastructure Development Project. Estimated at \$50 million, the project, which has not yet been approved, would provide long-term debt financing to infrastructure projects to be sponsored by private investors. It is designed to develop a modern and efficient system of infrastructure in Sri Lanka for promoting significant private sector participation in the investment, operation, ownership, maintenance, and management of infrastructure facilities. The Private Sector Infrastructure Development Committee, under the Ministry of Finance, would be the executing agency.

U.N. Industrial Development Organisation

Industrial Pollution Reduction Program. Based at CEA, the program provides low-cost technical assistance for waste minimization audits and loans to install recommended equipment to minimize waste. Past assistance has been provided to the textile, metal-finishing and distillery industries. To date, the program has assisted eleven facilities in Sri Lanka. Although the program provides generous benefits for industry (e.g., it pays all costs of pollution control equipment except shipping and installation), it has not been embraced wholeheartedly by Sri Lankan industry, due to its close ties to CEA (information collected during country visit by John W. Butler and John J. Mapes [June 17–21, 1996]; USAID [N.d.]).

assessment:
TAIWAN

Prepared by:

US-AEP



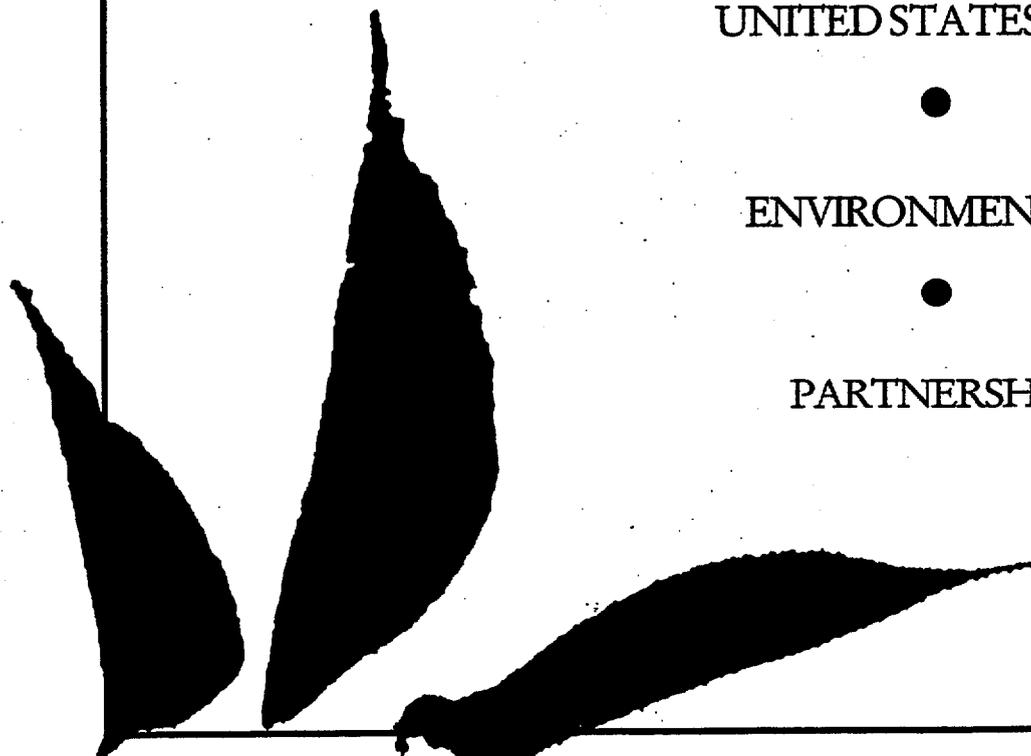
UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



Taiwan

By John Butler

Taiwan has experienced remarkable economic growth and, with an annual per capita income of more than \$12,000,* is at the forefront of the "East Asian Miracle." This growth, however, has come at great environmental cost; in response, the government has since the late 1980s put into place sweeping environmental policies to address industrial and urban environmental problems. Perhaps even more significant, Taiwan recognizes the importance of environment as a major factor in competitiveness in today's global marketplace and has instituted policies and programs that integrate environmental considerations into industrial and economic development policies. Although public access to information on industrial environmental performance has improved in recent years, it is limited; currently few avenues exist for the public to participate in environmental policy decisions.

1. Economic Profile

Demographic Conditions and Trends

With a population of more than 21 million on an island of 36,000 square kilometers, Taiwan has the second highest population density in the world. As has been the case with the other high-performing economies of East Asia, Taiwan's political leaders have pursued economic policies based on the principle of shared growth, promising that all groups in the country would benefit as the economy expanded. Taiwan now has one of the highest rates of income equality in Asia.¹ This is reflected in the well-being of its citizens; infant mortality rates are among the lowest in Asia, on a par with Japan, and adult illiteracy has been reduced to 7 percent.

Economic Conditions and Trends

Taiwan has experienced tremendous economic development during the past twenty years; gross domestic product has risen from \$49 billion in 1975 to \$241 billion in 1995. During this period annual per capita income rose from \$964 to \$12,490. The composition of economic sectors has followed the traditional development path; agricultural production value has dropped from 13 percent of gross domestic product in 1975 to 4 percent in 1995, whereas the production value of services rose from 47 percent to 60 percent during the same period. Industrial production is still a major driver of the economy, although production value dropped from 40 percent to 36 percent from 1975 to 1995. Today, Taiwan exports about \$93 billion of goods annually, about \$4,400 per capita.²

* Unless otherwise indicated, all dollar amounts indicate U.S. dollars.

acronyms

BOO	Build-own-operate
BOT	Build-own-transfer
CEPD	Council on Economic Planning and Development
CNS	Chinese National Standards
EIA	Environmental impact assessment
GDP	Gross domestic product
IDB	Industrial Development Board
ISO	International Organization for Standardization
ITRI	Industrial Technology Research Institute
MOEA	Ministry of Economic Affairs
NGO	Nongovernmental organization
NIMBY	“Not in my backyard”
R&D	Research and development
ROC	Republic of China
TEPA	Taiwan Environmental Protection Administration
US-AEP	United States-Asia Environmental Partnership
USEPA	United States Environmental Protection Agency

2. Environmental Profile

Industrial and Environmental Development Background

The majority of Taiwan industries are small and medium sized; however, many of these industries, including food processing, textiles and garments, leatherware, and wood products, which once dominated Taiwan's exports, have lost their dominant position to capital- and technology-intensive industries. These include chemicals, petrochemicals, information, electrical equipment, and electronics. Appreciation of the exchange rate, rising wage rates, and emerging labor shortages, combined with increased demands for a cleaner environment have contributed to the export of many of the more labor- and pollution-intensive industries to other countries in the region.³

Environmental Conditions

The Taiwan Environmental Protection Administration (TEPA) has an extensive network of stations for monitoring air and water quality. A total of sixty-six automated air quality-monitoring stations are now in operation. According to analysis of TEPA's monitoring data, the number of days on which TEPA's Pollutant Standard Index exceeded the “unhealthy” threshold for respirable particulate matter consistently rose every year from 1988 through 1992 but showed a sharp decline for 1993 and 1994. The number of days when the index's threshold for SO₂ was exceeded fell precipitously from 1991 to 1994, following implementation of a new policy in 1993 that required significant reductions in the sulfur content of fuels.⁴

Surface waters are a major source of Taiwan's water supply (rivers provide about 59 percent of the country's water supply, whereas reservoirs provide 19 percent). A 1991 TEPA survey of water quality in fifty major rivers yielded the following results. Three-quarters of the total length of the rivers measured was found to be unpolluted or slightly polluted, whereas the rest was found to be polluted and badly polluted. An assessment of the water quality of twenty reservoirs for nutrient-based pollutants indicated that water quality in twelve was excellent or acceptable but poor in the rest.⁵

Groundwater is an important water supply source, accounting for about 22 percent of total water consumption. Industrial users account for 19 percent of total groundwater use. Although groundwater pumping is regulated, demand has far outstripped the ability of regulatory authorities to manage aquifer use effectively. Because groundwater is basically a "free" resource, overpumping is a serious problem in Taiwan and has resulted in serious land subsidence (e.g., 68 percent of the area of the Taiwan Basin subsided more than 0.5 meters during the 1980s). In addition, lack of effective groundwater protection measures has allowed significant contamination of groundwater. A 1991 survey of groundwater sources found 34.5 percent of the samples used for drinking water unacceptable for drinking due to total bacteria content and 15.6 percent unacceptable due to coliform bacteria.⁶

Environmental Trends

TEPA has developed an impressive data base on the pollutant discharge and waste generation of eleven industry groups and three specific state-owned enterprises. The system can produce pollutant discharge projections comparing a natural growth scenario with the current regime of environmental regulation. For example, TEPA estimated the growth of total particulates in 1991 to be 11.4 percent less than would have been the case without regulation.⁷

In 1991, four years after the formation of TEPA, private sector investment in pollution control equaled almost 6 percent of total private sector manufacturing investment. In 1992 it equaled 4.3 percent of total investment. Pollution control for state-owned industries rose from almost nothing in 1988 to 18.9 percent of fixed investment in 1990 and to 30 percent in 1992. When investments by state-owned industries are included, it would appear that Taiwanese industry in 1992 expended a larger share of its investment budget in pollution controls than Japanese firms did at the height of Japan's pollution control effort.⁸

3. Government

Key Ministries for Industrial and Environmental Matters

Because the Taiwan government has integrated environmental policies and programs into its core industrial and economic agencies and ministries, a number of government institutions have important roles to play in industrial environmental matters, including the following:

Economic and Financial Special Group. Industrial policy is led by a small number of agencies and individuals in the central government. The president and the Economic and Financial Special Group are at the top of the system. The latter is an informal inner group of the cabinet consists of the ministers of

economic affairs and finance; several other ministers without portfolio; the governor of the central bank; and the director general of the budget. The group is advised by the Council for Economic Planning and Development, Industrial Development Bureau, and the Council for Agricultural Planning and Development.⁹

The *Council for Economic Planning and Development (CEPD)*, within the Executive Yuan, provides policy support to the ministries and the president. The council formulates short- and medium-term development plans, but implementation responsibility resides with the Industrial Development Bureau (see below). CEPD's latest development plan promotes the "ten emerging industries" (see section 4).¹⁰

The *Science and Technology Group* is an independent body that reports to the Executive Yuan and oversees the budgets, plans, and programs of science and technology agencies. The group draws on distinguished scholars from around the globe, including the United States, in evaluating Taiwan's science and technology priorities and needs.¹¹

The *Ministry of Economic Affairs (MOEA)* is the central agency for economic and industrial planning and program implementation. The ministry has a wide array of agencies under its jurisdiction and is involved in essentially all government activities affecting Taiwanese industry.¹² MOEA agencies that are most directly engaged in industrial environmental matters include the following:

- The *Industrial Development Bureau (IDB)* is responsible for implementing a large array of industrial development incentives, including incentives for waste minimization and pollution control. It plays a leading role in public sector research and development (R&D) policy, has strong ties to the Industrial Technology Research Institute (see below), and has a role in allocating subsidized credit from state-owned banks to particular industries and firms.¹³
- *Bureau of Commodity Inspection and Quarantine* has the lead role for promoting and implementing ISO (International Organization for Standardization) 9000 and ISO 14000, including certification. From April 1989 to June 1996, it provided ISO 9000 registration to more than 800 Taiwanese businesses free of charge.¹⁴
- *National Bureau of Standards*. This bureau has lead responsibility for developing ISO 9000 and CNS (Chinese National Standards) 14000 standards (equivalent to ISO 14000) and has established a committee to draft the former.¹⁵

Industrial Technology Research Institute (ITRI). ITRI is the premier industrial R&D institution in Taiwan, established in 1973. Although the majority of ITRI's funds come from MOEA, the institute is working to become more self-supporting by providing consulting services to industry. ITRI performs a wide range of technology research activities. In addition to pollution control, waste treatment, and waste minimization research and development, the institute has an aggressive program to support industry in implementing environmental management systems. The government established the National Center for Cleaner Production within ITRI in November 1995 to provide a catalytic and coordinating role for cleaner production, including international cooperation in cleaner production, coordination of cleaner production information and resources within Taiwan, technical assistance, consultation to industry and regulatory authorities, and education and promotion.¹⁶

Taiwan Environmental Protection Administration. Originally established as the Environmental Protection Bureau under the National Health Administration in July 1982, the bureau was later upgraded to the current independent and ministry-level body in August 1987. TEPA is Taiwan's main environmental administrative unit; it is organized under the Executive Yuan into seven bureaus, based on environmental media, and an Office of Science and Technology Advisers. TEPA had a budget of more than \$280 million in fiscal 1995, whereas the total government budget for environmental protection amounted to \$492 million.¹⁷

The *Ministry of the Interior* oversees the Department of Public Works responsible for construction and management of sewage systems.

Other Key Institutions on Industrial and Environmental Matters

TEPA operates and supports various institutions engaged in environmental research and institution strengthening, including the National Institute of Environmental Analysis (laboratory analysis and test methods), the Environmental Research and Development Institute, and the Environmental Personnel Training Institute.

The cities of Taipei and Kaoshiung and the Taiwan provincial government have key roles in implementing environmental standards established by the central TEPA. Although TEPA sets standards, much of the inspection and oversight activities required to assure compliance reside within the Taiwan Provincial Environmental Department and the Taiwan and Kaoshiung environmental agencies.¹⁸

4. Policies and Laws

The Taiwan government has pursued a highly focused policy of economic development that includes close integration of industrial and environmental policies. Government and business leaders recognize that environment is rapidly becoming a major factor in competitiveness in the global marketplace. Taiwan's legal and policy framework for promoting clean technology and environmental management consists of an arsenal of tools, including command and control policies, market-based instruments, promotion and support of voluntary standards, and public information (through Taiwan's Green Mark program).

Environmental Policies and Laws¹⁹

Taiwan's first environmental laws date from the mid-1970s, although they were substantially strengthened in the 1980s.²⁰

The laws are media specific (air, water, solid, and hazardous waste); ambient air and water quality standards generally follow U.S. standards. Implementation of these laws has sparked an outpouring of regulations in recent years—from 668 pages of standards in 1989 to 1,562 at the end of 1994.²¹ TEPA implements a rigorous emissions and effluent standard-setting process and an equally rigorous monitoring and enforcement program. The agency initiated an air and water discharge permits system in 1993. A two-phase system exists for water; more rigorous standards (still under development) will become effective in 1998. Standards for conventional water pollutants are industry specific, whereas toxic pollutant standards are generic for all industries.

Taiwan's hazardous waste regulations are similar to those of the United States in the way that wastes are classified and in the management standards that have been issued. Companies assume liability for wastes they generate; however, this requirement has not been rigorously enforced because no treatment facilities currently exist. (Unlike the United States, Taiwan is opting for government-sponsored central treatment facilities).

Manufacturers or importers of toxic substances, as defined by TEPA, are required to obtain permits under Taiwan's Toxic Chemical Substances Control Act. To deal with chemical accidents, TEPA in conjunction with municipal authorities has established a comprehensive emergency response network. TEPA has developed a data base of chemical substances to assist government and industrial facility managers in identifying hazards and implementing appropriate responses.

Industrial Policies and Laws

The central government has launched an ambitious campaign to establish an Asia-Pacific Operations Center, intended to make Taiwan a global trading center for the region. As part of this initiative, the government is aggressively promoting twenty-four key, high-technology, high-value-added economic activities in the "ten emerging industries."²² These industries, which include environmental goods and services, were selected because they cause little pollution, are not energy intensive, have strong market potential, are technologically demanding, and have high value added. Firms in all of the "ten emerging industries" are favored by tax policies, eligible for loans from commercial banks and the Executive Yuan's Development Fund at preferential rates, and given priority consideration in land acquisition. Firms are organized by law into industry-specific associations.²³

In implementing this policy, MOEA has organized committees, consisting of representatives of CEPD, the National Science Council, TEPA, and IDB, for each of the "ten emerging industries." These committees are directed to establish a manufacturing center in conjunction with the government's plans to establish the Asia-Pacific Operations Center. Environmental considerations, including clean production design, are integral to the committees' activities.²⁴

The government of Taiwan is keenly aware of the crucial role that environmental performance plays in today's marketplace. The U.S.-Asia Environmental Partnership's (US-AEP's) industrial policy assessment team found that Taiwan has embedded an environmental ethic in its industrial policy and regime. Industrial development officials consistently cite international competitiveness, corporate profitability, and reductions in the cost of command and control as reasons for the government's national strategy of implementing an array of "carrot and stick" policies to foster investment in clean technology and improved industrial environmental improvement. The government's melding of industrial and environmental regimes is exemplified by establishment in 1989 of the MOEA/TEPA Integrated Task Force for Industrial Waste Reduction, charged with promoting pollution prevention and providing technical assistance to industries.²⁵

Although much of the pollution control and prevention efforts for industry are made by MOEA through ITRI, IDB, and the MOEA/TEPA Integrated Task Force for Industrial Waste Reduction, TEPA has primary responsibility and oversight for administering environmental regulatory programs.

Public Information Policies and Laws

The government does not have a "Freedom of Information" kind of law. Although a public disclosure bill has been drafted, it is thought to be several years away from enactment by the Executive Yuan. In principle, TEPA has an agency policy to provide access to the public on information concerning industrial environmental performance; however, in practice the information is difficult to obtain and the public is not generally aware of what is available or how to interpret it. TEPA does not provide opportunities for public comment on its proposed regulations and typically does not conduct public hearings until its packages have been submitted to the Executive Yuan.²⁶

Under Taiwan's Green Mark program, initiated in February 1993, more than 200 products have qualified for ecolabeling. To qualify, a firm must meet the following requirements: (a) no environmental protection agency has taken any measure against the firm within one year prior to application for Green Mark status, (b) the applicant has achieved "remarkable results" in reducing wastes, and (c) the applicant meets the standard specifications stipulated by TEPA.²⁷

Legal and Policy Developments of Particular Relevance to Industrial and Urban Environmental Management

As mentioned above, the Taiwan government has closely integrated industrial and environmental policies. CEPD, MOEA, ITRI, and TEPA are the major government players in a concerted effort to encourage improved environmental performance and pollution prevention among existing industries and to stimulate investment in cleaner production technologies in new plants. Some of the most interesting policy developments with respect to US-AEP are described in this section.

As part of the central government's policy of creating the Asia-Pacific Operations Center, IDB and CEPD have established a policy to encourage further development of the newly emerged pollution-control industry. This policy includes (a) commissioning advanced R&D work, (b) establishing a testing center for pollution control equipment, (c) raising the effectiveness of end-of-pipe treatment technologies by developing incineration systems featuring energy recovery and environmental protection, (d) strengthening technology related to waste treatment and resource recycling, including expanded use of recycled materials, (e) prioritizing the use of cleaner production technology for the electronics, computer, steel, automotive, petrochemical, textile, dyeing, metal surface treatment, electroplating, and leather industries, and (f) assisting businesses in obtaining ISO 14000 certification and continued development of environmental strategies.²⁸

The new National Cleaner Production Center at ITRI is conducting extensive research on pollution intensities of industrial processes. ITRI is doing this to find ways to redesign production processes to reduce their pollution intensity, assess industry-specific performance in Taiwan against international best practices, and track industry-specific performance over time.²⁹

Industrial parks play a major role in Taiwan's industrial policy; thirty-nine parks currently operate. The government is actively pursuing a policy of developing "intelligent industrial parks," which are linked together by international telecommunications systems. Two such parks—in Hsinchu and Tainan—currently exist. TEPA has recently initiated an enforcement policy that requires industrial parks to have service

centers in place that are responsible for meeting water standards and for implementing pretreatment standards for industrial users of central wastewater treatment facilities.³⁰

The government has established an interministerial committee to prepare a coordinated central government response to ISO 14000. Under the scheme prepared by the committee, the National Bureau of Standards is responsible for developing CNS standards, the Bureau of Commodity Inspection and Quarantine is responsible for building accreditation and certification systems, IDB provides technical assistance and leads a coordinating committee of industries, TEPA promotes the Green Mark (ecolabeling) system, and the Bureau of Foreign Trade collects information to track implementation of ISO 14000.³¹

Taiwan has implemented a range of market-based instruments to encourage investment in clean technology and pollution control. Most of these are subsidies, although some recent but imperfect policies are based on user and discharge fees.³²

The permit system implemented by TEPA includes requirements for self-monitoring and -reporting by industry. TEPA has recently required the sixty largest industrial boilers to implement continuous emission-monitoring systems, although this requirement is not strictly enforced. TEPA is contemplating continuous monitoring requirements for water discharges in the future.³³

TEPA has implemented an air pollution charge scheme for fuel-burning sources. The legislature nearly abolished the system in its first year of operation, because it was viewed as unfair (it is actually a fee on fuels rather than on emissions, based on sulfur and lead content); however, the charge is still in place and last year provided NT\$3.6 billion* in revenue, compared with the planned NT\$6.9 billion per year originally projected by TEPA.³⁴

Air and water permitting is a major new challenge for TEPA and Taiwan's industries. Air permits are applicable to about 4,800 facilities. As of June 1996 only about 700 facilities had applied for permits. Of the roughly 90,000 industrial facilities in Taiwan, only about half have applied for water permits, although the deadline for application was May 1995.³⁵

New emission standards will significantly affect a major segment of Taiwan's industry. In early 1996 TEPA issued standards for volatile organic compound air emissions from surface-coating operations. The agency plans to issue these standards for the petrochemicals industry in 1997.³⁶

Environmental impact assessment (EIA) is a relatively new tool in Taiwan; the EIA Act was only enacted in December 1994. Although an EIA process existed in Taiwan prior to this act, it was not backed by enforcement authority or weight of law. Under the act, which is implemented by TEPA, EIAs are now required for all major projects, including industrial parks and proposed industrial facilities that exceed specified size thresholds identified in TEPA's guidelines.

TEPA has recently put a groundwater-monitoring system into place. Because the system provides data on the extent of groundwater contamination in Taiwan, greater attention is likely to be given to this issue. A Soil Protection Act to require cleanup of contaminated sites has been pending in the Legislative

Yuan for the past four years. Outlook for enactment remains uncertain, although some possibility exists that it may pass in 1996 or 1997.³⁷

5. Urban Environment and Infrastructure

The most pressing environmental concerns in Taiwan continue to be the need for environmental infrastructure. To meet this need, the government is experiencing tremendous pressure to privatize via the build-own-operate/build-own-transfer (BOO/BOT) route, but overall prospects for privatization are bleak due to the government's unwillingness to commit funds for providing guarantees. The legal framework for establishing project structures is still immature. In addition, no legal framework exists for project financing that provides for tax rules and contract laws. TEPA has assigned Sinotech the role of planning the BOO/BOT process for Taiwan.³⁸ The following summarizes the current status of environmental infrastructure and plans for the future:

Water Supply

A 1991 survey of all counties and cities in Taiwan Province found that 30 percent of the tap water was unacceptable for drinking due to the total bacteria content.³⁹ The poor have 10,000 to 20,000 illegal wells, most of which are contaminated. Nevertheless, clean tap water is not the highest priority in Taiwan.⁴⁰

Wastewater

Sewage connections for domestic wastewater account for only 3 percent of households, mostly in the Taipei area. In this regard, it is worth noting that the Tanshui River Project, scheduled to be completed in 1996, involves primary treatment only, combined with an ocean outfall.⁴¹ The government has allocated \$30 billion over fourteen years for wastewater treatment. Construction of urban sewerage systems worth about \$3 billion when completed in 2001 is the single largest undertaking. The central government is implementing local wastewater plants in four major cities.⁴²

Solid Waste

More than 75 percent of Taiwan's landfills are at or near capacity, and land is scarce. TEPA had planned for development of twenty-two municipal solid-waste-to-energy incineration facilities to handle 75 percent of Taiwan's municipal solid waste by the end of the decade. Frustrated by delays due to NIMBY ("not in my backyard") issues and convoluted public contracting procedures, TEPA drafted plans for future incineration projects with private sector participation; all incineration projects that had not moved forward by June 1, 1996, are now eligible for BOO/BOT participation. TEPA estimates that between thirteen and twenty-one incineration plants will be built under this plan. The new plan calls for incineration plants not included in the original plan, about eight county facilities projected thus far. A city/county authority will be established to oversee the projects under the new plan.

Recycling efforts of TEPA include creation of a subsidized foundation that operates twenty recycling centers around the island. In April 1996 the Taipei Department of Environmental Protection launched a comprehensive recycling program combining source separation, collection, and recycling.⁴³

Hazardous Waste

Even though TEPA has hazardous waste regulations similar to the United States, currently no central facilities exist in Taiwan for treating and disposing of hazardous wastes.

6. Private Sector and Academia

Industry

Almost 2,000 industries have received ISO 9000 certification. Taiwan industry is also readying itself for introduction of ISO 14000 standards. Five companies are working with ITRI to conduct a pilot environmental management system program.

The *China Productivity Center* provides government-subsidized (IDB) management consulting to Taiwan industry. The center is a significant provider of assistance to Taiwan industry in developing quality management systems under ISO 9000. The center is preparing to assist industries in establishing environmental management systems under ISO 14000.

The *American Chamber of Commerce* in Taipei is one of the most active groups in Taiwan's business community engaged in environmental affairs. The chamber's basic position is twofold:

- U.S. corporations in Taiwan have considerable experience in handling hazardous and organic wastes under the U.S. regulatory framework and can share their knowledge with TEPA on such things as which regulations work and do not work, which are too stringent, and how the introduction of new regulations should be timed.
- Pollution standards in Taiwan should ultimately be as stringent as they are in the United States and Europe but should be phased in over time.⁴⁴

In a highly publicized court case, General Electric has agreed to clean up an industrial site that was contaminated by the previous owner. General Electric will use the U.S. Superfund characterization framework for determining the remediation strategy.⁴⁵

Academic and Research Institutions

Universities provide extensive support to the central government in areas such as clean technology and environmental monitoring. *National Taiwan University's* Graduate Institute of Environmental Engineering and ITRI's new National Cleaner Production Center are actively engaged in characterizing the relative environmental risks of alternative production technologies.⁴⁶

Taiwan Institute of Economic Research plays a major research role on industrial economic policies and does extensive work for MOEA and other ministries. Recent research on environmental policies has been limited but includes a current study of market-based instruments for environmental protection. The institute plays a leading role in Taiwan's representation on the Pacific Basin Economic Council and publishes an annual report on the council's activities.⁴⁷

Academia Sinica is the highest ranking academic institution in Taiwan. Headquartered in Taipei, this group operates eighteen institutes on topics that include the physical, life, and social sciences. The Institute of Ethnology published *Taiwan 2000: Balancing Economic Growth and Environmental Protection*, a widely cited publication.⁴⁸

Financial and Insurance Institutions

The Central Bank of China is responsible for managing the monetary supply and controlling foreign exchange. Local banks in 1991 included 16 local commercial banks, 8 small- and medium-sized business banks, 1 post office savings bank, 74 local cooperative banks, and 308 farmers' and fishermen's financial institutions. Foreign banks operated 35 branches throughout Taiwan.⁴⁹

The US-AEP assessment team's information on bank policies with respect to environmental matters is limited; more research is needed. The team found, however, from its assessment visit that the banking association in Taiwan has not addressed environmental matters to date. Because EIAs are required by law for new industrial facilities, submittal of EIAs is typically a bank requirement for loan applications. Banks may review EIAs, but more research is needed to determine the extent to which EIA findings are incorporated into lending decisions.

As a condition for approval of government-subsidized loans for pollution control equipment, one commercial bank contacted during this assessment requires certification of the equipment by an independent environmental organization.⁵⁰

7. Environmental Awareness and Public Involvement

General Public Awareness of Environmental Issues

Recent public opinion polls have cited industrial pollution as one of the top three problems facing the country.⁵¹ The reaction of Taiwan's people to environmental degradation around them has mostly taken two forms in the past decade: (a) a NIMBY syndrome, mentioned above, marked by protests generally involving working-class villages and/or farming and fishing communities that have suffered directly from the effects of pollution and (b) formation of urban environmental groups, which owe their existence to the lifting of martial law in 1987 and gradual liberalization of the political sphere, the burgeoning middle class in the late 1980s and its growing concern for the quality of life, and easing of restrictions on the media.⁵²

Public nuisance complaints are a major mode of public "participation" in environmental matters. In 1991 more than 61,000 complaints were filed in Taiwan Province, of which industrial and commercial complaints accounted for 53 percent of the total. In response to the large number of public nuisance cases, the Legislative Yuan passed the Public Nuisance Disputes Resolution Act in 1992. The act employs a three-tier system of mediation-remediation-adjudication to resolve public nuisance disputes. Mediation is conducted by committees modeled after U.S. independent regulatory commissions. Public nuisance dispute resolution committees exist in every county.⁵³

Nongovernmental Organizations

The establishment of environmental nongovernmental organizations (NGOs) is a fairly recent development, because they could only be legally established within the last seven years. Now a number of influential NGOs exist, most centered around biodiversity and animal protection. NGOs engaged in environmental matters may be categorized into the following four categories⁵⁴:

General. The Green Consumer Foundation is a major player in the Taipei Department of Environmental Protection's recycling program. The foundation is also a major organizer of Taiwan Earthday. The Taiwan Environment Protection Union, formed in November 1987, is one of the more political groups in that it takes a strong and public stand on issues. The union campaigns on pollution issues, whereas the Homemaker's Union Foundation works on issues that affect the household, including pollution. The Beautiful Taiwan Foundation seeks to fulfill its name.

Profession based. The New Environmental Foundation is largely academic in focus. The Institute of Environmental Resources Research Center offers environmental resource research, engineering planning, and environmental impact assessment. The Health, Welfare, and Environmental Foundation focuses on medical, social welfare, and environmental protection research and activities. The Pro Green Foundation of the Republic of China, the Resource Recovery Foundation of the Republic of China, and the Taiwan Aluminum Can Recycling Foundation focus on recycling.

The Air and Waste Management Association and Water Environment Federation each have active chapters in Taiwan. The Air and Waste Management Association held its second International Comparative Risk Analysis Symposium in Taipei in November 1994. In November 1995 the Water Environment Federation cosponsored MOEA/TEPA's International Conference on Waste Minimization in Taipei, an annual event.

Regional and community based. The Hsinchu Anti-Pollution Association focuses on environmental concerns around the greater Hsinchu area. The Womens' Association for the Environment works closely with the Taipei Department of Environmental Protection in conducting public forums on environmental issues.

Business NGOs. The Green Business Forum was recently formed by businesses (with participation by the Green Consumer Foundation) to provide a forum for dialogue between businesses and environmentalists. The forum is conducting an industry survey of environmental management systems and is interested in sharing its results with the media and other countries. The Business Council on Sustainable Development was launched in December 1995 to promote sustainable development concepts with Taiwanese businesses in conjunction with the World Business Council for Sustainable Development. As of June 1996, the council had twelve corporate members. Although the council is still in its infancy, it is considering a number of projects to implement in 1996.⁵⁵

8. U.S. Government Activities

U.S. Environmental Protection Agency

Under bilateral agreements signed in 1993 and 1994, the U.S. Environmental Protection Agency (USEPA) is providing extensive assistance and cooperating with TEPA. In addition to these activities, USEPA is supporting the proposal by the Government of Taiwan to establish a pollution prevention clearinghouse sponsored by TEPA, ITRI, and IDB. Taiwan is working under the Asia-Pacific Economic Cooperation forum to implement a Cleaner Production Center jointly with the Oregon Center; USEPA and TEPA will be major cosponsors.⁵⁶

US-AEP Activities in Taiwan

US-AEP has supported 161 environmental exchanges, has processed 258 trade leads, and sponsored 27 technology grants through the National Association of State Development Agencies, in addition to initiatives through the Council of State Governments. With USEPA, US-AEP has supported environmental action teams, short-term technical assistance, and training modules.

9. Other Bilateral and Multilateral Organization Activities

Bilateral

During the literature review conducted under this US-AEP country assessment, Sweden was the only other country in the world besides the United States found to have a bilateral agreement with Taiwan involving environmental protection.

World Bank

Taiwan was disengaged from the World Bank in 1990.

Asian Development Bank

Taiwan is a member of the Asian Development Bank, with a 0.655 percent share.⁵⁷

United Nations

Taiwan has not been a member of the U.N. General Assembly and Security Council since 1971. In spite of this, Taiwan has stated its acceptance of and commitment to Agenda 21 and the Rio Summit. TEPA has announced that Taiwan would complete a National Environmental Action Plan, as fifty U.N. members now have.⁵⁸

10. Opportunities to Support Clean Production and Environmental Management

Policy Framework

Pollution intensity. Taiwan is already pursuing cutting-edge policies and programs to promote clean production and environmental management, but one particularly promising area of engagement is ITRI's

research program to characterize the pollution intensity of industrial processes. This activity could provide a springboard to involving other countries in the region to pursue similar endeavors. Also, a joint effort to explore the linking of pollution intensity to rewards, such as fiscal and financial incentives, could spur firms to search for ways to reduce the pollution intensity of their output.⁵⁹ Taiwan chapters of the Air and Waste Management Association and Water Environment Federation may provide important venues for reaching environmental professionals in addressing issues such as pollution intensity measurement and risk assessment.

Public access to information. Although TEPA appears to have a wealth of information on industrial environmental performance, especially compared to other countries in the region, public access to this information is extremely limited. Information disclosure may be one area in which US-AEP could effectively engage TEPA. The two new business NGOs in Taiwan, Green Business Forum and Business Council for Sustainable Development, offer valuable venues to promote "clean revolution" ideas. Both organizations require member companies to pledge disclosure of their environmental performance to the public (for the Green Business Forum, companies pledge to report annually). US-AEP should collaborate with these groups in pursuing its information disclosure initiative

Industrial Environmental Management

Industrial estates. Other opportunities for clean production and environmental management may involve joint U.S.-Taiwan efforts centered around the continued development and enhancement of Taiwan's industrial estates. The Taiwan government has already realized the importance and implications of these estates; Taiwan may prove a willing partner in examining policies for improved environmental management of industrial estates.

Banking community. Opportunities directed at the banking community should be explored. Engaging the banking association and providing articles on relevant environmental issues for publication in major banking trade publications (e.g., the *Economic Review* of the International Commercial Bank of China) may be productive ways to promote environmental policies.

Groundwater management and remediation. Groundwater management is one area in which Taiwan's policies appear to be in dire need of improvement. Engagement with MOEA, TEPA, and the academic community on water resource pricing could yield substantial results. Improved techniques for aquifer management and groundwater protection are also needed. Although Taiwan has many highly qualified environmental engineering companies that have a competitive edge over U.S. companies, groundwater/soils remediation may be a promising new market for many U.S. firms. Inclusion of environmental goods and services as one of Taiwan's "ten emerging industries" combined with Taiwan's concerted drive to establish an Asia-Pacific Operations Center offers tremendous opportunities for U.S. companies willing to commit to long-term business growth in the region and to partner with Taiwanese companies. Legislation establishing a remediation program in Taiwan still appears to be a few years away, but, when it comes, it will offer new business opportunities for U.S. and Taiwanese firms.

Environmental Infrastructure

Wastewater and solid waste. Taiwan's environmental infrastructure efforts for the next three years focus on wastewater treatment, solid waste management and air pollution control. Municipal solid waste and wastewater treatment projects account for approximately 60–70 percent of the total investment. A strong trend toward localization is also characterized by lack of clarity regarding the devolution of environmental project management and enforcement authority to city and county governments. CEPD coordinates Taiwan's infrastructure efforts.⁶⁰

Privatization. The pressure on the government to privatize via the BOO/BOT route is strong, but overall prospects for privatization are bleak due to the government's unwillingness to commit funds.³⁴ The BOT activity for water supply appears to be five years away. The immediate opportunities for BOT projects are in solid waste incineration under the new TEPA plan, which may have limited potential for U.S. firms, because much of the construction and design will be done by local firms.

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Endnotes

1. World Bank (1993, 13, 31).
2. Republic of China (1996c, 5).
3. Rock (1996); Republic of China (1996e).
4. Rock (1996, 30); Republic of China (1996a).
5. Republic of China (1993, 112–16). Note that the terms “unpolluted,” “slightly polluted,” and “badly polluted” are based on TEPA’s definition, which combines dissolved oxygen, biological oxygen demand, total suspended solids, and ammonia nitrogen values into a scoring system. For reservoirs, pollution ratings were based on indicators of eutrophication.
6. Republic of China (1993, 119–128); Wu (1990, 27–28).
7. Rock (1996, 20).
8. Rock (1996, 26–27).
9. Rock (1996, 9).
10. Rock (1996, 9, 35).
11. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
12. Administrative authorities within MOEA include:
 - Industrial Development Bureau
 - Board of Foreign Trade
 - National Bureau of Standards
 - Bureau of Commodity Inspection and Quarantine
 - Investment Commission
 - Medium and Small Business Administration
 - Energy Commission
 - Export Processing Zone Administration
 - Central Geological Survey
 - Water Resources Planning Commission
 - Commission of National Corporations (state-owned enterprises)
13. Rock (1996, 9–10).
14. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
15. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
16. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.

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17. The following lists the bureaus within TEPA and some of their major areas of responsibility and focus (information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes [June 10–14, 1996]; Su [N.d.]).
- *Bureau of Comprehensive Planning*. EIA program, national and regional planning, public participation, risk communication, and environmental education.
 - *Bureau of Air Quality Protection and Noise Control*. Air pollution control plans, emission standards, air pollution fees, and noise reduction.
 - *Bureau of Water Quality Protection*. Point and nonpoint source controls; groundwater program planning, standards development, monitoring, and remediation; marine and coastal water protection; pollution prevention; sludge management; watershed planning.
 - *Bureau of Solid Waste Control*. Solid waste management, hazardous waste management, privatization of municipal solid waste incinerators, and recycling programs.
 - *Bureau of Environmental Sanitation and Toxic Chemicals Control*. Chemical substance risk evaluation and data base, licensing and assistance for toxic chemical operations, drinking water protection, pesticide management, and toxic chemical release reporting and management.
 - *Bureau of Performance Evaluation and Dispute Settlement*. Evaluation of Public Nuisance Dispute Settlement Act implementation.
 - *Bureau of Environmental Monitoring and Data Processing*. Air and water quality monitoring, geographic information system and remote sensing, and Nationwide Environmental Protection Information Network.
 - *Office of Science and Technology Advisers*. Research and development agenda, international agreements and partnerships, and international cooperation.
18. CIEL (1995).
19. Unless otherwise noted, information for this section was obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
20. The following summarizes the major environmental statutes applicable to the industrial sector that have been recently enacted or amended (Republic of China 1996b, 1–3):
- *Water Pollution Control Act*. Amended in 1991.
 - *Air Pollution Control Act*. Amended in 1992.
 - *Waste Disposal Act*. Amended in 1988.
 - *Noise Control Act*. Amended in 1992.
 - *Toxic Chemical Substances Control Act*. Amended in 1988.
 - *Public Nuisance Disputes Resolution Act*. Enacted in 1992.
 - *Environmental Impact Assessment Act*. Enacted in 1994.
21. Republic of China (1996a, 37).

Endnotes

22. The “ten emerging industries” are:
 - Telecommunications
 - Information
 - Consumer electronics
 - Semiconductors
 - Precision machinery and automation
 - Aerospace
 - Advanced materials
 - Specialty chemicals and pharmaceuticals
 - Medical devices
 - Environmental technology.
23. Rock (1996, 21–22).
24. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
25. Cylke, Richards, Rock, and others (1995, 8–9).
26. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
27. Rock (1996, 33).
28. Republic of China (1996d); Chinese (ROC) News Agency (1996).
29. ITRI is evaluating the pollution intensity of industrial processes using three broad indexes (Rock [1996, 25–26]; Su, [N.d.]): (a) waste generation index (volume of wastes per unit output or unit of value added), (b) toxicity index, and (c) energy consumption index.
30. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes (June 10–14, 1996); “The Republic of China on Taiwan” (N.d.).
31. Rock (1996, 33); information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes (June 10–14, 1996).
32. The major market-based instruments currently in effect relevant to industrial environmental management are (Republic of China 1996b):
 1. *Subsidies*
 - Tariff exemption for imported pollution control equipment
 - Low-interest loans for purchase of pollution control equipment
 - Investment offset in corporate income tax for purchase of pollution control equipment
 - Accelerated depreciation for air and water pollution controls
 - Tax-exemption for retained profits used for purchased pollution control equipment
 - Reduction in land appreciation tax for firms moving for environmental reasons.

2. *Discharge fees*

- Effluent charges for firms in industrial parks, based on volume of water use and pollutant loadings to central treatment plants
- Air pollution fee for fuel burners (actually a surcharge on fuels based on lead content for gasoline and sulfur content for fuel oil)
- Air pollution fee for ozone-depleting substances (Montreal Protocol).

3. *Deposit-refund*

- PET bottle deposit system.
33. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes (June 10–14, 1996); US-AEP (1996a, 4).
 34. Republic of China (1996b).
 35. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
 36. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
 37. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
 38. US-AEP (1996b).
 39. Republic of China (1993, 128).
 40. US-AEP (1996b).
 41. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes (June 10–14, 1996); US-AEP (1996a, 4).
 42. US-AEP (1996b).
 43. Republic of China (1996e; 1996a, 6).
 44. Business International Asia/Pacific (1992).
 45. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
 46. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
 47. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.
 48. See “The Republic of China on Taiwan” N.d., T8–T9.
 49. Price Waterhouse (1991).
 50. Information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes, June 10–14, 1996.

Endnotes

51. Rock (1996, 31).
52. During the 1980s environmental disputes frequently led to confrontation and violence. Some of the most prominent examples include the following:
- In 1985 protests mushroomed against a proposal from Taiwan Power Company to build a fourth nuclear power plant at Kung Liao on the northeast coast. It had been revealed that radiation leaks had occurred on several occasions at the other three plants. Construction was delayed until funding for the project was restored in June 1992.
- In 1985 Du Pont ran into trouble for siting a pigment plant in Lukang in Changhua County, central Taiwan. This was not the corporation's first plant on the island and, although foreign investment approval had been given and the project was under way, vigorous local opposition to the plan began in early 1986. The project was abandoned in 1988; Du Pont chose another location in Tao-yuan County next to Taipei County. Du Pont, having learned its lesson, adopted a bottom-up approach: it worked at winning over the local people through community outreach campaigns and face-to-face discussions with local leaders. It has since established a community committee of local scientists, environmentalists, and businessmen; the EIA for the plant is a now a public document.
- In 1988 violence erupted when 2,000 villagers forced their way into Linyuan Industrial Park near Kaohsiung in protest against untreated wastewater discharge from eighteen factories in the park. The protesters took over the centralized wastewater treatment plant and forced the factories to close down. The companies later paid NT\$1.2 billion in compensation to residents.
53. Republic of China (1993, 438–43).
54. Information in this section is drawn from information obtained during US-AEP country assessment visit by John W. Butler and John J. Mapes (June 10–14, 1996) and Business International Asia/Pacific (1992).
55. Projects under consideration by the Business Council for Sustainable Development include:
- Policy assistance on the designation of nature preserves and wildlife sanctuaries
 - Policy initiatives with TEPA on watershed management, groundwater management, and coastal planning
 - Policy development with TEPA to modify and expand procedures for public comment and input on proposed regulations and dispute resolution
 - Business management issues on eco-efficiency
 - Business management practices focusing on environmental cost accounting
 - Heritage preservation
 - Preparation of Chinese translations of important international materials on sustainable development and environment
 - Collecting and disseminating information on recycling programs in Taipei and Taiwan in general
 - Policy development on business issues associated with waste disposal.
56. Marianne Bailey, Asia Program Manager, Office of International Activities, USEPA (August 22, 1996).

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57. Chinese (ROC) News Agency (1996).
 58. Chinese (ROC) News Agency (1996).
 59. This recommendation is taken from Rock (1996, 26).
 60. Although the government provides funding for projects, the legal structure for establishing the project structure is still immature. In addition, no legal infrastructure exists that provides for tax rules and contract laws with respect to project financing. CEPD is also the key agency that performs the function of a "Ministry of Finance." CEPD is looking for ways to improve the legal structure and is asking the Ministry of Justice to work jointly with them.
 61. The key issue for the government is that they will need to stay involved by taking on risks and providing guarantees. TEPA has assigned Sinotech the role of planning the BOO/BOT process for Taiwan. Sinotech is producing the BOO/BOT criteria for bid evaluations, which are stringent. Companies must demonstrate a proven track record in Taiwan. Projects are disqualified if 10 percent of the project is delayed.

country
assessment:
THAILAND

Prepared by:

US-AEP



UNITED STATES-ASIA



ENVIRONMENTAL



PARTNERSHIP



Thailand

By Malcolm Forbes Baldwin

Thailand is a country about twice the size of Wyoming, unique in Asia for being neither colonized nor occupied during this century. A middle-income country now, it achieved remarkably rapid growth in the 1960s through the 1970s and again since the late 1980s. Bangkok, with nearly 90 percent of Thailand's urban population, has grown rapidly as the country has shifted from a high dependence on agriculture to substantial industrial manufacturing and exporting. Thailand's economic growth has coincided with a rapidly degraded environment in and around Bangkok in particular, requiring immense investment in environmental infrastructure. Impetus for ever cleaner industrial production is being spurred by government policies favoring industrial siting outside Bangkok, improving environmental enforcement, rising public and community environmental awareness, and increasing recognition of the global market pressures for better industrial environmental management.

1. Economic Profile

Demographic Conditions and Trends

With a population of 60 million, the dominant demographic shift has occurred from rural to urban areas and to Bangkok in particular. As late as 1970, about 80 percent of the population consisted of small farmers.¹ Population growth rates declined from 1984 to 1994 from 1.9 to 1.3 percent, but urban areas, notably Bangkok, have grown steadily. By the year 2025 approximately 70 percent of Thailand's population is expected to be urban.² Thailand has maintained a high literacy rate (93 percent), although it has suffered from low secondary education enrollment, which hampers the enhancement of its skilled work force.³

Economic Conditions and Trends

Between 1965 and 1990, Thailand's gross national product per capita grew at 4.4 percent per year, ranking Thailand as eighth among the middle-income countries measured by the World Bank.⁴ Agriculture has had a continually declining share of gross domestic product (from 32 percent to 12 percent); manufactured exports have increasingly exceeded agricultural exports since 1985.⁵ Food, textiles, chemicals, fabricated products, and machinery have been the predominant industries.⁶ Inflation has so far been fairly well controlled; until the mid-1990s rates were among the lowest in the developing world.⁷ Although all regions of the country have increased economic benefits, it is the Bangkok metropolitan region that has prospered the most; annual per capita income in the northeast is 30 percent that of the Bangkok region.⁸ Skilled labor shortages mean that, at the same time that Thailand pursues economic development demanding increasingly high levels of technology, it must also establish a trained workforce,⁹ while trying to contain rising labor costs. Government efforts in the 1990 have so far been successful in curbing inflation and expanding exports. Thailand is expected to continue growing at a relatively high rate, although growth in 1996 was down from previous levels.

acronyms

BOI	Board of Investments
EIA	Environmental impact assessment
EQPD	Environmental Quality Promotion Department
ISO	International Organization for Standardization
MOI	Ministry of Industry
MOSTE	Ministry of Science, Technology, and Environment
NEB	National Environmental Board
NEQA	National Environmental Quality Act
NGO	Nongovernmental organization
OEPP	Office of Environmental Policy and Planning
PCD	Pollution Control Department
US-AEP	United States-Asia Environmental Partnership
USAID	United States Agency for International Development

2. Environmental Profile

Industrial and Environmental Development Background

Thailand's stages of development were marked in the 1960s by import replacement, in the 1970s by labor intensity, and in the 1980s by export industry.¹⁰ In the 1990s it has so far been characterized by support for high technology, low labor intensity, and value-added growth. Since the 1973 popular uprising that toppled the governing military regime, competitive elections and democratic government have, with some interruptions, been the norm.¹¹ Industrial development has been spurred by private not public investment; central government expenditure, as a percentage of gross national product at 15.1 percent in 1989, is far lower than other countries in the region.¹² But although the proportion of government-owned enterprises is low, private Thai ownership of large businesses has been high.¹³ Thai firms have also made important investments in Indonesia, Vietnam, China, and the United States.¹⁴ Direct foreign investment in Thailand is important but nevertheless lower than in other countries in the region.¹⁵

Environmental Conditions

With Thailand's rapid development has come severe and widespread environmental problems that have captured media and public attention. During the 1980s much of the environmental concern focused on the rapid loss of forests from the 1960s into the 1990s and the environmental impacts of coastal development and pollution. Energy-environment conflicts arose on hydroelectric dam proposals affecting natural ecosystems, eventually prompting legislation favoring energy conservation.

Environmental Trends

During the 1990s urban and industrial environmental trends have become increasingly critical. Bangkok has developed rapidly with limited state planning or intervention and policies that emphasized private sector and capitalist approaches to growth. Now Bangkok is notoriously traffic clogged,¹⁶ resulting in recognized health as well as economic costs,¹⁷ and the number of vehicles is increasing daily. Its polluted waterways have highlighted the need for vast new investment in infrastructure; only 2 percent of Bangkok's 10 million people are served by sewers. Solid waste disposal and the need for recycling have become public concerns because the collection of 8,000 tons per day—which will rise quickly to 10,000 tons—is overwhelming existing landfills.¹⁸ The number of hazardous waste-generating industries has risen from 631 in 1969 to 51,500 in 1990; the number of potential hazardous waste generators has more than doubled between 1979 and 1989.¹⁹ The result is an increasingly severe problem for the public as well as for industry,²⁰ one that, given community pressures, must be handled in on-site facilities.

Although the environmental problems in Thailand extend nationwide, Greater Bangkok is taking the brunt of their costs. As one government official put it, "The direction is quite clear, Bangkok is now a problem, with allergies, noise, and general environmental degradation. Environment is now a big issue with the people."²¹

3. Government

In 1992, with passage of the Enhancement and Conservation of Environmental Quality Act,²² the Thai government proposed a newly active role in integrating environmental management with urban and industrial development. Although fulfillment of that objective will require increasing commitments of human and financial resources and time, the policy shift has profoundly affected the government's environment and industrial ministries and agencies.

Key Ministries

The new National Environmental Quality Act of 1992 (NEQA) addressed the weak structure of environmental management by creating a new Ministry of Science, Technology, and Environment (MOSTE) with standard-setting and enforcement authority and a new, cabinet-level National Environment Board (NEB) representing all major ministries and headed by the prime minister with the deputy prime minister and minister of MOSTE as vice chairs. (The Ministry of Industry and Board of Investment also influence environmental policy in Thailand as discussed below.)

National Environmental Board. The prime minister is an active head of the interministerial NEB.²³ It has statutory authority to approve environmental quality standards; approve action plans; recommend actions to the cabinet regarding monetary, fiscal, or other policy measures for implementing NEQA; and supervise management and administration of the environmental fund, among other authorities.²⁴

Ministry of Science, Technology, and Environment. MOSTE is responsible for three state enterprises²⁵ and nine departments, three of which are directed by NEQA to carry out functions that may be added to

by NEB. The latter three are the Office of Environment Policy and Planning, the Pollution Control Department, and the Environmental Quality Promotion Department. MOSTE also manages the environmental fund on behalf of NEB.

- *The Office of Environmental Policy and Planning (OEPP)* within MOSTE has taken over most of the work of the former, less elevated NEB.²⁶ OEPP is growing; about 500 million baht* comes in every year, thanks to the Environmental Fund established under NEQA.²⁷ Overall, the fund has some 7 billion baht available. These funds go to government agencies and local governments for wastewater facilities, loans to the private sector for pollution control and management, and approved nongovernmental organization (NGO) activities. OEPP now has 200 permanent staff. Although OEPP's budget has increased from 300 million to 2 billion baht in three years and it has more equipment, it has half the people it did five years ago. One consequence is that more work needs to be contracted out.²⁸

OEPP's highest priorities are water and air pollution, emphasizing water recycling and reduction of air emissions. Its operating premises are that standards must be met and no change can occur in downstream uses by project pollution loading. Despite immense tasks ahead, the prevailing sense at OEPP is that progress is being made, partly because MOSTE and MOI are cooperating in their environmental goals under a jointly chaired "coordinating committee" involving other agencies as well.³⁹

- *The Pollution Control Department (PCD)* has, among other functions,³⁰ authority to set pollution standards for NEB approval and carries out enforcement actions in cooperation with and with power to supersede MOI.³¹ The standards are tough and require polluters to treat up to 90 percent of their waste and to establish treatment plants.³² Enforcement, however, has not been stringent, although improving.³³ To carry out its enforcement and other duties,³⁴ PCD has 300 permanent and 200 temporary staff and intends to increase by another 400–500 by the year 2000.³⁵ Its budget has increased since 1992 from 50 million to 800 million baht in 1996.³⁶ For PCD, as for other parts of MOSTE, staff quality at lower than the top levels is the biggest problem. Especially needed are environmental engineers, who get three times their government salary in the private sector. Work must be contracted out to cope with the problem. Significantly, however, MOSTE has earmarked substantial resources for overseas fellowships to improve its human resources.³⁷

As NEQA requires, PCD has established *pollution control areas* to control, reduce, or eliminate pollution in localities where it threatens human health or environmental quality.³⁸ PCD supports NEB by helping localities to draft and implement their action plans and providing government support for required facilities.³⁹

- *The Environmental Quality Promotion Department (EQPD)* primarily conducts public education and awareness programs, including work with ecological camps for young people, recycling campaigns, and media programs. EQPD manages a research and training center

funded by the Japanese. It also oversees relations with and helps build the capacity of environmental NGOs. Sixty-five environmental NGOs have so far been officially registered and certified by the department for NEB after demonstrating their past work in the field. These NGOs can receive support from the Environmental Fund, which now offers 100 million baht annually.⁴⁰

The Ministry of Industry. MOI has six departments and six state enterprises. It works closely with MOSTE but has a substantially larger budget. MOI is increasingly emphasizing ways to reduce waste and not to focus on a command and control approach alone.⁴¹ It shares with MOSTE an interest in applying market-based incentives,⁴² building on its limited experience with effluent charges.⁴³ MOI recognizes, with MOSTE, that the regulatory management measures heretofore exclusively applied by PCD under NEQA have proved too stringent and expensive for the 80,000 small- and medium-sized factories in Thailand. As a step in a new direction for large industries, a new plan for industry in the Bangkok area will require a minimum plant size and will emphasize pollution prevention first and pollution control second.⁴⁴

MOI is planning a *clean production information center* for operation next year with government funding and help from the Danish and German governments. Its purpose is to introduce clean production into Thai industry as a matter of MOI policy, focusing on what technologies are cleaner sector by sector for tanneries, textiles, and electronics. They are also establishing with Japanese help a Water Reuse Promotion Center as part of the Clean Production Center to help reduce and recycle water in food processing, pulp and paper, and textile industries. A key question to be addressed is what kinds of government policies or approaches, such as subsidies or fee structures, will make clean technology sustainable?

- *The Department of Industrial Works* monitors and enforces standards on industrial operations and has the authority to revoke a factory's operating license. This department looks inside the plant, whereas PCD's enforcement focuses on what comes out of the pipe.⁴⁵

To help MOI find ways to dispose of existing and increasing quantities of hazardous industrial waste,⁴⁶ the Department of Industrial Works will shortly update the output figures last gathered seven years ago. Hazards are posed by existing industrial areas, such as the Samut Prakarn area west of Bangkok, which has 300–400 factories and no adequate sites for hazardous waste disposal. Together with rising quantities of hazardous materials, some believe that this issue should receive Thailand's highest priority in industrial pollution management.⁴⁷ A plan for six new hazardous waste incinerators is being developed, but it must address rising community opposition to siting; hence, sites are being proposed inside industrial estates.

- *The Thai Industrial Standards Institute* has a staff of 500 engaged in several topics of key interest to the U.S.-Asia Environmental Partnership (US-AEP). One is the institute's work with the Thailand Environmental Institute in developing the *Green Label* program.⁴⁸ The Thai Industrial Standards Institute is also actively engaged in promoting and supporting ISO (International Organization for Standardization) 14000. The institute represents Thailand at ISO; its National Accreditation Council was established as the governmental body authorized

to certify firms under the Thai Industrial Standards for ISO 9000 and now ISO 14000. The institute will adopt the English version (with a Thai summary) of these latter standards. A pilot program of the institute will train ten companies in getting certified, step by step, during ten months.⁴⁹ It has also trained ISO 14000 trainers.⁵⁰ The institute is particularly concerned about small- and medium-sized enterprises and how they can upgrade themselves for ISO certification.⁵¹

- *The Industrial Estates Authority of Thailand* runs twenty-three industrial estates containing 1,000, mostly large factories⁵³; the authority is responsible for enforcement.³⁴ Estates are either owned and managed by the authority, joint ventures with a private developer, or wholly managed and owned by private developers.⁵⁴ Only the first two categories receive incentives and government promotional privileges from the Industrial Estates Authority of Thailand.

The *Board of Investment*, in the Prime Minister's Office, is the primary agency responsible for providing fiscal and nonfiscal incentives that stimulate investment in Thailand⁵⁵ and, most recently, for helping Thai firms invest in Association of Southeast Asian Nations and other countries in the region.

BOI is closely linked to MOI and MOSTE through overlapping board memberships of government officials. BOI's policy focuses today on high technology industries, low-polluting or pollution-controlled industries,⁵⁶ and the location of industry outside of Bangkok.⁵⁷ Clean technology is not in itself a high priority now, but getting industry out of Bangkok is. The program of incentives and privileges for areas outside Bangkok include incentives for foreign investment in export production or, if in the most remote industrial zone, domestic markets. Privileges, including tax exemption for five to eight years, are offered for investors locating in estates with pollution controls.⁵⁸

Other Government Agencies Concerned with Pollution Control

Enforcement of environmental regulations and requirements is handled by numerous ministries, departments, and divisions. In addition to MOI, the Ministry of Interior's *Public Works Department* regulates municipal wastewater treatment facilities outside of Bangkok, whereas the *Bangkok Metropolitan Authority* handles the Bangkok area. The Ministry of Public Health's *Department of Health* implements its own enforcement program concerning any danger to the public. In addition, the *Police Department* and the *Land Transport Department* share some enforcement responsibilities. The *Ministry of Finance* oversees the government's fiscal matters. It works in cooperation with other ministries on a variety of fiscal programs intended to reduce pollution.

4. Policies and Laws

Prior to passage of NEQA in 1992, Thailand had generally weak environmental legislation; environment had been only tangentially addressed in various five-year plans, beginning with the Fourth National Economic and Social Development Five-Year Plan in the late 1970s. By the time of the Sixth Plan a decade later, when the National Economic and Social Development Board was in its ascendancy, pollution

management was receiving modest attention, although natural resource extraction remained the guiding force behind economic growth. The Seventh Plan, however, placed high priority on pollution. Evidently, economic achievement had allowed more people to be concerned about the quality of life.⁵⁹ As the economy became more globalized, increasing pressure was felt from the international community through businesses as well as donors. The new Eighth Plan, now under preparation, will include a new financial component, encourage citizens and communities to bring pressure on polluters, and commit to the opportunities and needs presented by ISO 14000.⁶⁰

Environmental Policies and Laws

Thailand has recently added environmental provisions to its Constitution.⁶¹ A number of laws have addressed toxics and energy. The 1992 NEQA and 1992 Amendments to the Factories Act, however, provided Thailand with a new and more vigorous approach to its industrial pollution and related environmental problems. This legislation strengthened setting, planning, and enforcement of environmental standards; established a cabinet and high-level interministerial governmental focus on environment; and provided a partially self-sustaining environmental fund for local government and industrial pollution management investments and environmental NGO support.⁶² The Hazardous Substances Act of 1992, implemented by the Ministry of Industries, is another set of key regulations affecting use of dangerous substances and responsibilities for their effects.⁶³

Public Information Policies and Laws

Thailand is gradually adopting practices that foster more open disclosure of information on industrial pollution and government regulatory actions.⁶⁴ NEQA includes a provision for information to the public, but it is discretionary, not mandatory.⁶⁵ To support further engagement of environmental NGOs, the act also provides for assistance to environmental NGOs through the environmental fund.⁶⁶

A key provision of NEQA concerns implementation of the environmental impact assessment (EIA) requirement. Whereas EIAs had previously been prepared after projects had been approved by the National Economic and Social Development Board, now approximately 90 percent of EIAs go into review along with project feasibility studies. Although OEPP and NEB do not reject private projects unless the location is unacceptable, projects are nevertheless subject to modification. EIAs are prepared for a specified list of projects with somewhat different procedures for government and private projects.⁶⁷ The statute does not, however, require the public availability of the EIA, although the documents are apparently made available to the public for review in the OEPP library.⁶⁸

Industrial Policies and Laws

EIAs are prepared on industrial operations seeking BOI privileges and must be certified by MOSTE and MOI to receive privileges or other tax incentives. EIAs on industrial estates are a potential opportunity for addressing clean technology and pollution management as well as effective public disclosure of industrial pollution information. At present, no public information is available on industrial pollution other than what might come from an EIA available to the public on a plant operation.

As a party to the Montréal Protocol, Thailand must eliminate use of chlorofluorocarbons by 2000. The effect on industry means a quest and market for safe substitutes for the 15,000 tons of chlorofluorocarbons it imports each year.⁶⁹

Legal and Policy Developments of Particular Relevance to Industrial and Urban Environmental Management

Two developments are particularly relevant to US-AEP. First, public disclosure of information on industrial activities is a topic of concern within the Thai government and the Thai Environmental Institute, as well as for the media and other NGOs. A trend to greater disclosure of information to the public is evident. The Parliament is also considering a community right-to-know act, already approved by the cabinet, that will address some of these issues.⁷⁰ Second, the Thai government and nonprofit and industry groups are also increasingly interested in market-based incentives to supplement and in some cases substitute for the command and control approach. The Eighth Plan, for example, will show the trend toward support for voluntary compliance, particularly ISO 14000.

5. Urban Environment and Infrastructure

Infrastructure development is one of Thailand's most pressing needs; the growth of its industries depends on it. More than 80 percent of the industrial water supply of industries concentrated in and around Bangkok is taken from wells rather than public water supply systems, causing severe salt water intrusion. Water supplies for industrial growth on the eastern seaboard is also falling behind demand. Wastewater treatment and solid waste management systems are badly needed throughout the country, particularly in and around Bangkok.

Water Supply

Thailand is slowly moving toward greater private sector participation in providing clean drinking water. Although full cost pricing is gaining favor, water is still subsidized, because rates do not cover operating and maintenance costs. The Provincial Waterworks Authority recently solicited bids for Thailand's first private build-own-transfer water project in the Pathum Thani/Rangsit region. Four more are expected. Together the five privatized water supply projects are estimated to be worth \$152 million.*

Wastewater

The government is investing heavily in wastewater treatment; more than \$1.63 billion dollars has gone into planned wastewater and sewerage projects by PCD, another \$85 million in projects by OEPP, and \$165 million in projects by the Bangkok Metropolitan Authority.⁷¹ A new Wastewater Management Agency is being established with assistance from the Asian Development Bank to handle wastewater collection and treatment nationwide. It will begin with responsibility for Bangkok and the five surrounding provinces with a later extension to cover the rest of the country.⁷² Pricing issues remain; currently, no effective ways exist to enforce sewage fees because services cannot be shut off.

Solid Waste

The Bangkok Metropolitan Authority estimates that Bangkok generates a total of 6,600–8,300 tons of solid waste per day, of which 5,000 tons will be disposed of in sanitary landfills operated by private companies. The authority is investigating new incineration projects and various other waste disposal techniques and is particularly interested in advanced U.S. waste-to-energy technology. To address issues outside Bangkok, PCD has commissioned two studies for privatizing regional solid waste management for the five surrounding provinces and the eastern seaboard.

Hazardous Waste

Thailand, like other countries, faces the problem of increasing hazardous waste; at present, only one central hazardous waste treatment facility is in operation, serving mostly textile and electroplating industries.⁷³ Policy questions involve community concerns about the location of new hazardous waste treatment facilities; practical questions involve adequate enforcement of hazardous waste regulations that will provide a reliable stream of waste to these facilities. Nevertheless, one of the first private environmental infrastructure projects underway concerns hazardous waste.⁷⁴

6. Private Sector and Academia

Industry

Industrial growth and the rising importance of business in Thai governance have been concomitant trends.⁷⁵ Thai business associations have become increasingly important as vehicles for engaging in policy dialogue with the government.⁷⁶ Leading industries in Thailand are textiles, chemicals, and electronics. All of them are represented by associations that play a key role in developing policy in Thailand. Among the leading associations concerned with environment is the Federation of Thai Industries. Other associations include the Association of Thai Bleaching, Dyeing, Printing, and Finishing Industries; and the National Federation of Thai Textile Industries.

Thailand is developing a strong consulting sector that is engaged in designing infrastructure of projects as well as preparing EIAs. Among the leading firms in the infrastructure arena is Premiere Global. The Consulting Engineers Company, is one of Thailand's largest engineering firms, with approximately 1,000 employees.⁷⁷

Although business interest in environment has been sparked by increasing enforcement, public concern, and growing international trade pressures,⁷⁸ wide agreement exists among Thai businesses and consulting firms that incentives to implement clean technologies are weak. Yet, some interesting initiatives reflect the changing commercial effects of environmental concerns. The Thailand Business Council for Sustainable Development, for example, chaired by Anand Panyarachun, former prime minister, launched the Thai Green Label Scheme in August 1994 with the Thailand Environmental Institute and the Ministry of Industry. The program is being implemented by the Thai Industrial Standards Institute with assistance from the Thailand Environmental Institute, discussed below.

Academic and Research Institutions

The leading environmental think tank is now the Thailand Environmental Institute, which spun off from the Thailand Development Research Institute in the early 1990s. The Thailand Environmental Institute is cooperating with MOI on ISO 14000 and the Green Label Program and, with MOSTE, on development of environmental management plans. The institute serves as the secretariat for the Thailand Business Council for Sustainable Development with which it is working on an ISO 14000 pilot project for council members.⁷⁹ The institute's business and environment program will also include programs for small- and medium-sized enterprises.⁸⁰ The institute has also worked, with support from the German Agency for Technical Cooperation, with the tannery, palm oil, and canned tuna industries to develop economic tools for industrial environmental management.

The Asian Institute of Technology is actively developing programs to address clean technology requirements. The institute offers master's and Ph.D. degrees and provides a skill center for professional outreach and short courses. One-third of its faculty and students are Thai, and the rest come from eighteen other countries. The institute will offer a master's degree program in pulp and paper engineering in 1997.⁸¹

7. Environmental Awareness and Public Involvement

General Public Awareness of Environmental Issues

Environmental concern in Thailand is clearly rising within the media and among growing numbers of environmental NGOs; however, public and reliable information on environment is still a key problem, fostering distrust of government decisions and concerns about environmental impacts, which greater information could reduce. Opposition to the location of incinerators and landfills is growing within communities, as government officials recognize. A recent, impressive indication of environmental awareness was the election in June 1996 of Bangkok's new mayor, a former head of an environmental NGO with no previous government experience.⁸²

Nongovernmental Organizations

Perhaps 150 active environmental NGOs exist in Thailand. Although most of these are small and concerned with "green" issues, a few focus on urban issues.⁸³

8. U.S. Government Activities

U.S. Environmental Protection Agency (USEPA)

Beyond USEPA support of US-AEP/U.S. activities (USEPA Environmental Action Teams, and training modules), the agency has provided technical assistance to MOSTE.

U.S. Department of Energy

The Department of Energy's Environmental Management Office is concerned with management and handling of "foreign research reactor spent nuclear fuel" and has considered programs accepting spent

nuclear fuel from research reactors in Thailand. In addition, the Office of Nonproliferation is concerned with nonproliferation of weapons of mass destruction.

U.S. Agency for International Development (USAID)

USAID has for many years been the principal donor in environment in Thailand and has projects in urban infrastructure, toxic waste, biodiversity, coastal resource management, air pollution, water supply, and sanitation. The Management of Natural Resources Project was planned as a \$40 million—then reduced to \$20 million—program on topics ranging from biodiversity to industrial pollution. It included a significant and successful program with the Federation of Thai Industries concerned with industrial pollution management. The project also worked with MOSTE to introduce a battery-operated electric version of Thailand's signature *tuk-tuk* taxi to reduce air pollution from these three-wheel scooters. The USAID/Thailand mission closed in September 1996; the remainder of U.S.-Thai efforts are being handled through the U.S.-Thai Development Partnership and the Kenan Institute.

US-AEP Activities in Thailand

US-AEP has supported 453 environmental exchanges, processed 119 trade leads, and sponsored 41 technology grants through the National Association of State Development Agencies, in addition to initiatives through the Council of State Governments. With the U.S. Environmental Protection Agency, US-AEP has supported environmental action teams, short-term technical assistance, and training modules.

9. Other Bilateral and Multilateral Organization Activities

Other Western and European Engagements

European donors have been active in Thailand for many years. In the industrial environment arena, these include the German Agency for Technical Cooperation and the Danish International Development Agency, which is planning to provide up to \$10 million for industrial environmental projects. Canada and Thailand have entered into the Canada-Thailand Trilateral Environment Project to support social and economic development efforts in Indochina.⁸⁴

Significant new engagement of the European Union with Asia in the trade sector was highlighted by the February Bangkok meeting between representatives of the fifteen European Union members and seven members of the Association of Southeast Asian Nations. The agenda focused on enhancing economic cooperation, trade and investment, technology transfer, sustainable development, including environmental management, and related topics.⁸⁵ The European Union will be funding a large project involving the application of clean technology in a region near Bangkok containing some of the country's most polluting industries (including paper/pulp, food, and electronics), in cooperation with the Thailand Environmental Institute.⁸⁶

Japan

The Japanese International Cooperation Agency has been active in providing funding to MOSTE's Environmental Fund for an environmental laboratory and various projects, particularly related to solid waste.⁸⁷

World Bank and Asian Development Bank

The World Bank and Asian Development Bank have refined their Thailand strategies from general private sector development to increased privatization of general infrastructure; several significant projects are under way.⁸⁸

10. Opportunities to Support Clean Production and Environmental Management

Policy Framework

Thailand's efforts to encourage integration of environmental and industrial policies are just beginning, but prospects for success are encouraging so long as economic growth and political stability continue. Ongoing actions to strengthen ties between MOSTE and MOI are necessary to establish effective industrial/environmental policy. Thai government agencies are interested in cooperating with Malaysia, Indonesia, and the Philippines. Regional programs should draw from—as well as contribute to—Korean and Taiwan experiences. A number of promising developments are also concerned with industrial environmental policy incentives and information disclosure.

Market-based incentives. MOI and MOSTE have strong interests in developing incentive tools and in learning from the experiences of neighboring countries of the Association of Southeast Asian Nations and in East Asia. Specific topics of interest include promotional incentives for new industry, effluent charges, deposit/refund schemes, tradable permits, and resource pricing.

Other policy approaches not based on market incentives. Thailand is beginning a green labeling program, which would benefit from what other countries have learned. Indonesia's experience with its reputational environmental management rating systems (its Program for Pollution Control, Evaluation, and Rating), sparked strong interest in Thailand. So did Taiwan's experience with pollution intensity measures. The environmental accounting project in the Philippines was also of interest.

Environmental information and public participation. Increasing public environmental awareness and engagement and government programs to increase it offer important opportunities for partnerships with U.S. NGO, government, and business entities. Among the key topics of interest in Thailand appropriate for such engagement are the following:

- Monitoring and enforcement exchanges and workshops with local government
- EIA exchanges and workshops; work with state environmental protection agencies
- Toxic Release Inventory exchanges and workshops.

Devolution of environmental management. Thailand is increasingly concerned about issues of state and municipal infrastructure development and financing and state and municipal environmental enforcement, which will all affect future environmental and industrial policy in Thailand.

Industrial Environmental Management

Opportunities for engagement with U.S. business, NGO, and government entities are strong in a number of areas concerned with industrial environmental management:

Voluntary standards. ISO 14000, Responsible Care, and related supply chain issues are already topics of US-AEP engagement in Thailand. These and similar efforts may be emulated with major industrial sectors, such as the textile, pulp and paper, or automobile industry.

Industrial estates. These are of particular concern in Thailand, and BOI, MOSTE, and MOI are all involved in their development and management. Partnership opportunities are promising with respect to:

- Planning for infrastructure finance and development
- Response to the environmental problems of small- and medium-sized enterprises in and around industrial estates
- Opportunities to apply clean technology standards
- Opportunities to improve hazardous waste management
- Application of EIA/toxic release inventory requirements.

Capacity-building opportunities include potential joint projects with the well-respected Asia Institute of Technology, which is just beginning to engage clean technology issues, and Chulalongkorn University, which has individuals with interest and expertise in environmental management. An additional possibility with potential for both capacity-building and supply chain accountability is development of a “supplier university” in affiliation with major multinational corporations and Thai companies.

Hospital waste. As in each of the ten US-AEP countries, this waste is of particular concern in Thailand. Strong interest exists in new waste disposal systems from the United States through its technology transfer programs as well as through exchanges, links with environmental professional associations, and other partnership programs.

Environmental Infrastructure

Market for environmental goods and services. Major municipal and industrial project opportunities exist for water, wastewater, and solid waste. The market is competitive, and U.S. engineering firms are well represented in all three sectors. The total environmental market is estimated to be \$18.4 billion; about 80 percent of the investment is public and 20 percent private. The Asian Development Bank has issued plans for 1995–98 grants totaling \$1.2 million. Government funding controls have created bottlenecks, but procurement processes have improved greatly since 1992. More transparency would be helpful.

Funds for development. Raising funds for large-scale, public-private partnerships is challenging in the municipal environmental infrastructure sector. Mechanisms are needed to allow the in-flow of long-term capital to finance infrastructure projects. Local Thai banks are well-managed and capable of large-scale financing, but, in the area of water, wastewater, and solid waste, they depend heavily on assistance from the World Bank or Asian Development Bank. Due to the potential political risks, U.S. banks require strong credit support from project sponsors.

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Endnotes

1. Laothamatas (N.d., 198).
2. TEI (1996a, 11).
3. "Although universal enrollment in primary education has virtually been attained, the proportion of those going on to the secondary level remains very low at 33 percent" (ADB 1996, 371).
4. Thailand is ranked eighth among middle-income to lower middle-income economies among those for which gross national product per capita could be calculated (World Bank 1996b, 189).
5. Rock (1995).
6. TDRI (1990).
7. It reached 6 percent, however, in 1995.
8. ADB (1996b, 371).
9. Besides its devastating social impacts, the rising incidence of HIV/AIDs threatens human resource development and Thailand's competitive position (ADB 1996b, 376–77).
10. See Rock (1994).
11. One important reason for stability is Thailand's remarkable monarch, King Bhumibol Adulyadej, celebrating his 50th year on the throne. See "In Age of Instability, a King Anchors Thailand," (*New York Times*, June 10, 1996) and "Thai King Crowns 50 years of Unrivaled Popularity" (*Financial Times*, June 9, 1996).
12. Laothamatas (N.d., 195).
13. It has been noted that "Thai capital accounted for as much as 92 percent of the assets of the top 100 firms in the banking and finance industry in the country in 1990" (Laothamatas N.d., 202).
14. For example, one conglomerate operates a modern textile plant in the United States and another has acquired Bumble Bee, a leading American canned tuna company (Laothamatas N.d., 202).
15. Laothamatas (N.d., 195).
16. See Friedman (1996, A19).
17. High concentrations of SO₂, for example, put young children and the elderly at risk of respiratory illness. Anthropogenic sources of SO₂ include fossil fuel combustion and industrial activities. Bangkok's mean concentrations of SO₂ are extraordinarily high at 1,224 micrograms per cubic meter, compared to the World Health Organization–recommended exposures of 40–60 micrograms (WRI 1996, 154–56).
18. Solid waste is collected from 1.5 million households at a cost of \$8 million per year (Khun Narong Tosompark, director general, Cleaning Department, Bangkok Municipal Authority, Department of Public Cleansing, Bangkok [June 13, 1996]).
19. TDRI (1990, 14, 15).
20. Projections are that "hazardous waste–producing industries such as steel, textiles, electronics, and chemicals and petrochemicals will be an equally important or a more serious threat in terms of environmental impact than the traditional polluting industries" (TDRI 1990, 36).

Endnotes

21. Dr. Kanya Sinaxul, secretary general, Thai Industrial Standards Institute, Bangkok (June 13, 1996).
22. Enhancement and Conservation of National Environmental Quality Act (1992), B.E. 2535. Translated by Environment Law Center, MOSTE, EQPD, Bangkok.
23. NEQA calls for at least four and up to eight members of NEB from the private sector; NEB has eight members, including representatives of banks and the Thai Environmental Institute, and university professors. NEB operates as a kind of minicabinet with many debates on environment and economic development (PCD, Bangkok [June 11, 1996]).
24. NEQA, section 13.
25. The three state enterprises are the Thailand Institute of Scientific and Technological Research, National Science and Technology Development Agency, and the Wastewater Management Agency.
26. OEPP (a) prepares the national policy and plan for environmental protection in accordance with other national policies, (b) coordinates preparation of environmental quality management plans according to NEQA, (c) monitors and reports on the natural resource profile of specific problems or situations, and (d) coordinates natural resource management in accordance with natural policies.
27. Established in the Ministry of Finance under section 22 of NEQA, the fund receives money from fuel oil tax receipts, service fees, and penalties under NEQA, donor grants, and other specified sources. The fund is managed by an interministerial committee chaired by MOSTE's permanent secretary (NEQA, section 24).
28. Increasing reliance on the private sector for environmental management is an apparent trend evident throughout the assessment team interviews; it is affecting the regulatory as well as infrastructure development agencies in Thailand.
29. The committee was established and functions well due to the friendship of MOI minister and MOSTE's permanent secretary. At monthly meetings, the committee reviews projects, budgets, designation of pollution control areas, and enforcement actions. In addition to members from MOI, members include the secretary general of OEPP, the director general of the Department of Environmental Quality, and the director general of PCD (OEPP and MOI personnel, Bangkok [June 11–15]).
30. PCD (a) submits opinions for formulation of policy, (b) plans and promotes pollution control, (c) recommends formulation of environmental quality standards from sources, (d) formulates environmental quality management plans and measures to control, prevent, and mitigate pollution, (e) monitors and reports on the state of pollution, (f) develops systems, schemes, and appropriate methodologies for management of water, air, and noise pollution and handling of hazardous and solid wastes, (g) performs functions in accordance with NEQA, (h) takes action on petitions concerning pollution, and (i) performs functions as may be designated by law or ordered by the Ministry or Council of Ministers (NEQA).
31. Prior to recent law, if PCD received a complaint from a source, it would inspect; but for a violation, it could only inform MOI. Now, if MOI does nothing, PCD can order improvement and enforce standards. But the Department of Industrial Works of MOI still has initial responsibility for inspections.

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32. PCD, MOI, Bangkok (June 11–15, 1996).
 33. Enforcement has focused largely on the big polluters and not the 80,000 small- and medium-sized enterprises that employ 90 percent of the people and produce 50 percent of manufactured goods (Thai Environmental Institute, Bangkok [June 1996]).
 34. PCD prepares a state of the environment and state of pollution report. It is also starting a waste minimization program and a recycling project in cooperation with industry.
 35. Prior to NEQA, PCD had fifty people plus fifty temporaries as the Environmental Quality Standards division of NEB.
 36. PCD sought 3 billion baht for 1997 but will get 1.3 billion. Much of this is for wastewater treatment facilities, such as the 13 million baht facility east of Bangkok for common waste treatment by industry.
 37. MOSTE offers twenty fellowships a year for master's and bachelor's degrees; required government employment afterward lasts three times the fellowship period. Cabinet approval has been received to offer 165 fellowships for study abroad over the next five years for master's and Ph.D. degrees—half from inside and half from outside current staff—in Europe, America, Japan, Australia, or New Zealand. The Thai government pays the entire cost (Dr. Pornchai Tarantham, deputy director general, PCD, Bangkok [June 11, 1996]).
 38. NEQA, section 59. Local officials in the designated pollution control area are required to prepare action plans for “reduction and eradication of pollution” for the provincial (Changwat) governor and for incorporation into the Changwat Action Plan for environmental quality management, as required in section 37. Areas designated so far include Phuket, a tourist center, and Hatyai-Songkhla, an industrial center.
 39. PCD operates under the direction of an interministerial Pollution Control Committee chaired by the permanent secretary of MOSTE and responsible to NEB (NEQA, chapter IV, sections 52–54).
 40. This is down from the 400 million baht available under the fund at the outset; although the government has been reluctant to fund organizations apt to be critical, only 20–30 million baht have been spent so far, due to a low number of adequate NGO proposals, with another 60 million baht in approved projects (Chalerm Sak Wanichsomlat, deputy, Office of Environmental Promotion, Bangkok [June 10, 1996]).
 41. MOI, however, is ready to take legal action to convince industry to change its ways, as it has done in helping change dye practices and tannery practices (Khun Surikit Hansirisathait, chief, and Dr. Jullapong Thaveersri, environmental engineer and director, both of waste management, Department of Industrial Works, MOI, Bangkok [June 13, 1996]).
 42. MOSTE's permanent secretary, Kassem Snidvongse, who chairs the Pollution Control Committee and has stimulated close relations with MOI, has noted that “the stick is not working, and other incentives are needed to attract industry to long-term opportunities in clean production.” In cooperation with the Department of Industrial Works, he has proposed a pilot program on environmental management in cooperation with multinational corporations in three to four industries (Kassem Snidvongse, MOSTE, Bangkok [June 13, 1996]).

Endnotes

43. MOI already levies fees against industries that do not treat their effluent by establishing common waste treatment and charging industry for its use.
44. Pollution prevention began in Thailand with the U.S. Agency for International Development's Management of Natural Resources Project in 1991, which focused on textile dyeing, pulp and paper, food processing and steel making. In cooperation with the Federation of Thai Industries, teams were established for each industry; they studied waste minimization and pollution prevention in the United States (for chemicals) and Switzerland (for toxic substitution in dyes, followed by demonstration projects of the World Environment Center). More than twenty large- to medium-sized factories implemented recommendations in the dyeing industry (MOI, Bangkok [June 1996]).
45. As with PCD, action against a polluter is approved by the interagency coordinating committee, but if it is not a large company, the Department of Industrial Works may act immediately. The department's authority comes under the Factory Act, as amended in 1992, which authorizes a range of actions—for anything from serious violations requiring immediate action to those needing only a warning and additional time for compliance. The department has taken some thirty to forty actions against serious polluters under section 39 of the Factory Act (Department of Industrial Works, Bangkok [June 1996]).
46. MOI's Office of Toxic Substances is responsible for monitoring storage, collection, and handling of hazardous wastes.
47. The health and other hazards posed by hazardous waste, which now have no safe disposal systems in Thailand, have prompted concern that, however important pollution prevention and waste minimization are, containment of existing hazardous waste should be the highest priority and should be addressed first before "leap frogging" into clean production (Lisa K. Lumbao, commercial/environmental specialist, US-AEP Manila; Patrick Heninger, chief operating officer, General Environmental Conservation Company [in which MOI has a 25 percent interest] and managing director, Waste Management Project Services, Bangkok [June 13, 1996]).
48. The Thailand Environmental Institute owns the label, but the Thai Industrial Standards Institute does the technical work. The latter institute has just started with two products—a lead-free battery and a water-saving toilet. The institute needs help with life cycle analysis and a master plan for deciding what kinds of products to label. The institute supports testing of refrigerators and air conditioners for energy conservation labels; it also works with the Association of South-east Asian Nations' committee on green labeling.
49. The ten companies must have ISO 9000 certification; they must have a commitment by each company's chief executive officer to set aside two people to join the project. The Federation of Thai Industries will choose the companies based on these and other criteria. The Thai Industrial Standards Institute will pay for consultants by sharing costs with the company. Currently 160 firms are ISO 9000 certified; 200 are in the pipeline. The institute certifies 20 percent of them (Dr. Kanya Sinaxul, secretary general, Thai Industrial Standards Institute, Bangkok [June 13, 1996]).
50. The Thai Industry Standards Institute has trained forty people to do ISO 14000 training, including twenty-five in the Department of Industrial Works and the rest from the Thailand Environmental Institute and the private sector.

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51. Thailand cannot set fees for ISO certification of small- and medium-sized enterprises that do not meet the costs involved lest the World Trade Organization object that they are subsidies. (Dr. Kanya Sinaxul, secretary general, Thai Industrial Standards Institute, Bangkok [June 13, 1996]).
 52. Thames Water is operating seven of these, but its contract ends in 1997 and a new one will be bid for eighteen estates. In the other estates, staff of the Industrial Estates Authority of Thailand manages the infrastructure (Kasemsri Homchean, director, Environmental and Safety Control Division, Industrial Estates Authority of Thailand, Bangkok [June 11, 1996]).
 53. Outside the estates are another 50,000 factories. Inside, the Industrial Estates Authority of Thailand is responsible for enforcement that, by its account, is strict because of high penalties that presumably discourage dilution and other techniques for avoiding violations. The Industrial Estates Authority of Thailand also helps companies meet standards by conducting monthly seminars by consulting firms (Kasemsri Homchean, director, Environmental and Safety Control Division, Industrial Estates Authority of Thailand, Bangkok [June 11, 1996]).
 54. The Thai Industrial Estate Association, consisting of thirteen private industrial estate developers and the twelve jointly managed estates, works with the Industrial Estates Authority of Thailand and BOI to help develop and implement industrial estate standards. See IEAT (N.d.).
 55. BOI has foreign promotion offices, including in New York City. It interacts with the Economic Development Board in Singapore and with Taiwan. Neither country is seen as competition yet.
 56. BOI has a list of high-polluting industries from MOSTE. Participants need MOSTE's and MOI's approval. Approval requires an environmental impact assessment on operations. No explicit category exists for environmental goods and service industries as yet. Some nonpolluting industries do not require MOSTE approval.
 57. Thailand has three regional industrial zones: zone 1, Bangkok; zone 2, the ten provinces around zone 1; and zone 3, the rest of Thailand. BOI has incentives for getting industries into zone 3, reflecting its main policy.
 58. Other incentives include the following:
 - The Customs Department creates a tariff list of equipment with rates of 50 percent, 35 percent, and 5 percent (which constitutes 90 percent of equipment); BOI cuts the rates in half or can cut them to zero in zone 3.
 - Special incentives are available for manufacturing, for example, molds and dyes, centering/forging, fixtures, heat treatment, electronic connectors, rechargeable batteries, and engineering plastics.
 - Companies that bring in foreign exports as regional offices get nontax incentives, such as land approval and work permits.
 59. Among other shifts in attitude was the rising awareness among intellectuals of the flaws in the previous development model (Mr. Panithon, National Economic and Social Development Board, Bangkok [June 11, 1996]).
 60. Mr. Panithon, National Economic and Social Development Board, Bangkok [June 11, 1996].
 61. Article 74 of the 1991 Constitution requires the government to conserve and maintain the environment, prevent and eliminate pollution, and plan appropriate soil and water use (TEI 1996b, 25).

62. Interviews with Thai officials by the assessment team consistently found that agencies were working together on industrial and environmental issues in enforcement and promotion of new investments, in recognition of the importance of ISO 14000 and the environmental component of the global marketplace. The elaborate structure of boards, advisory groups, and committees involving multiple agencies has increasingly focused on effective responses to environmental concerns that the public and the media are urging.
63. TEI (1996b, 28, 29).
64. Progress began in the 1980s with better business-government interchange on policy and regulatory issues. But “[m]easurements of transparency and predictability in the regulatory environment still rank Thailand lower than the more advanced high performers—Japan and the four tigers” (Campos 1996, 97).
65. Section 6 of NEQA states that rights to information “may be accorded” to individuals “for the purpose of public participation and the enhancement and conservation of national environmental quality . . .” in matters related to government information, injuries and harm caused by pollution, lodging of complaints against pollution offenders, *and* assistance to government in performing their required duties. Although limited, the spirit of the law has opened new opportunities for public information and engagement.
66. See discussion above on NEQA, section 3.
67. The approval process for EIAs of government or joint government/private projects do not have time limits. EIAs are prepared at the feasibility study phase, go to review by NEB, which seeks and obtains OEPP approval, and then are sent for cabinet approval. For private projects, OEPP has fifteen days to review a document for completeness and, if complete and correct, another fifteen days for preliminary comment before submission to a committee of experts for a review period of forty-five days. Projects are either rejected or approved at that stage. If the expert reviews on private projects are not completed within forty-five days after they have received them from OEPP, the project must be deemed approved. See NEQA, part 4.
68. Chalerm Sak Wanichsomlat, deputy of environmental promotion, OEPP, Bangkok, June 11, 1996.
69. TEI (1996b, 41).
70. Chalerm Sak Wanichsomlat, deputy of environmental promotion, OEPP, Bangkok, June 11, 1996.
71. The Bangkok Metropolitan Authority is responsible for issuing six projects in the city’s twelve-year program to upgrade its wastewater treatment facilities serving 12 million residents. The authority normally pays for 40 percent of project costs; the rest is paid by the central government (US-AEP 1996).
72. The Wastewater Management Authority will have authority to build systems, collect service charges, borrow money (both internally and externally), issue bonds, and establish limited public or private wastewater treatment companies. The plan encountered some resistance from the Bangkok Metropolitan Authority, which currently oversees the country’s largest wastewater treatment projects (US-AEP 1996).
73. The manufacturing sector accounts for about 90 percent of the hazardous wastes in Thailand; the top 5 industries are basic metal, metal products, transport and vehicle assembly, electrical machinery, and agrochemical sectors (TEI 1996b, 40).

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74. Waste Management International will be playing a major role. This project was jump-started with funding from the U.S. Agency for International Development for a feasibility study. In its later stages, site-safety testing was supported by the U.S.-Thai Partnership. Despite community concerns and other uncertainties, the project has proceeded as a joint venture between MOI and the Thai company General Finance; Waste Management International holds a fifteen-year contract to design, build, and operate the facility (US-AEP 1996). The Thai government plans four more central hazardous waste management treatment systems (TEI 1996b, 40).
 75. "Following the election in 1975, business became the largest group in the Thai House of Representatives, making up 75 percent of the total membership. During the 1980s nearly 50 percent of the cabinet members had business background" (Laothamatas N.d., 201).
 76. Under the government of Prime Minister (General) Prem (1981-88) and the Fifth National Economic and Social Plan, a National Joint Public and Private Consultative Committee was formed, including the prime minister (as chairman), other government ministers (including the head of the Board of Investment) and the private sector (represented by the Thai Chamber of Commerce, the Federation of Thai Industries, and the Thai Bankers Association). Although the committee did not represent labor, agriculture, or public enterprises, it contributed substantially to more transparent information exchange on the impacts of government tax, regulatory, and other policies between big business and the government. Committee meetings were open to the press (Campos 1996, 96).
 77. Primary U.S. competitors are Metcalf and Edy, Bechtel, Montgomery Watson, PRC, Geraighty and Miller, Black and Veatch, Stone and Webster, and DFI. They also compete with other Thai firms, such as, in environment, Progress and Macro, and in infrastructure, Asia Engineering Company. (Team Consulting Engineers, Bangkok June 1996).
 78. Siam Cement, for example, has a company policy of getting ISO 14000 certified to promote good will and contribute to the country (Dr. Kanya Sinaxul, secretary general, Thai Industrial Standards Institute, Bangkok [June 13, 1996]).
 79. The Thailand Environmental Institute has engaged participants from the chemical, pulp and paper, plastic, soft drinks, and petroleum industries (TEI 1996b, 37).
 80. It is working with the Thailand Business Council for Sustainable Development to (a) conduct environmental audits small- and medium-sized enterprises in food and electroplating and (b) establish a cleaner technology information center based at the Thailand Environmental Institute to collect and disseminate national and international information on cleaner industrial technologies to serve industry, government, and the public (TEI 1996b, 39).
 81. Carl Webber, dean of School of Environment, Resources, and Development, and others, Bangkok (July 8, 1996).
 82. Pichit Rattakul, 50, an independent who lacks any experience in city administration, defeated the incumbent and a field of twenty-nine other candidates, according to the *Asian Wall Street Journal* (June 2, 1996).
 83. Among these groups are the following:
 - *The Project for Ecological Recovery*, based in Bangkok, has gained a reputation as one of the country's most articulate, youthful, and active environmental groups and is a leading

commentator on natural resources and pollution issues. It attempts to facilitate communication between villagers and the Thai government and its agencies, while promoting the necessity of sustainable development.

- *The Thai Coordinating Committee for Rural Development* is an umbrella group of 220 NGOs involved in rural and development issues. Although not strictly an environmental group, it has become more so in the past few years. It organized the "People's Forum," which ran parallel to the World Bank/International Monetary Fund meeting in October 1991.
 - *The Association for the Development of Environmental Quality* is a nonprofit research and education organization committed to environmental protection in Thailand. Established in 1988, its membership includes the general public, journalists, religious and cultural institutions, and government leaders.
84. The program is jointly managed by the Canadian International Development Agency and Thailand's Department of Technical and Economic Cooperation. It targets institution strengthening by providing linkages between private and public sectors in Canada, Thailand, and other Mekong River Basin countries (Vietnam, Cambodia, or Laos) (CIDA 1996).
85. See "Asia-Europe Meeting, The Coming Together of Two Worlds" (*The Nation*, February 28, 1996, A8).
86. The project, entitled "A Participatory Approach to Environmental Management and Clean Up in Samut Prakarn," is due to commence in July 1996 and last for eighteen months. It should result in a demonstration plant.
87. USAID (1995).
88. These projects include the following:

World Bank

- A \$150 million loan was granted to Thailand to address chronic traffic problems and finance-related environmental protection measures. Included in the environmental portion are air quality, environmental assessment, and mitigation related to the financed highway projects. The project will lead to the establishment of the Environmental Assessment Unit within the government's Department of Highways.
- In 1994 the World Bank provided a \$40 million grant for the Montreal Protocol Ozone-Depleting Substances Phase Out Multicomponent Project, administered by the Ministry of Industry's Department of Industrial Works. The department also administers a similar grant of \$390,000 provided for the Montreal Protocol Controlled Substances (Ozone-Depleting Substances) Engineering Project (World Bank 1996a; 1996b).

Asian Development Bank

- The Asian Development Bank gave an \$800,000 grant to the governments of the Greater Mekong Subregion, which includes the People's Republic of China, Cambodia, Myanmar,

Thailand, Vietnam, and Laos, to improve their overall capacities to formulate and implement environmental policies, legislation, and programs that are of common significance to their countries. Targets include deforestation, biodiversity, soil loss, water pollution, toxic wastes, air pollution, and degradation of urban environments (bank press release, May 17, 1996).

- \$100 million in loans has been awarded to Thailand for a Rural Electrification Project as part of the country's Seventh National Economic and Social Development Plan (See ADB 1996a; 1996b).
- In December 1995, a \$150 million loan was used to help build a major wastewater treatment project outside Bangkok. It is the first project to adhere to the "polluter pays" principle. The total project cost is estimated at \$507 million. Part of the package included an industrial pollution prevention and clean technology transfer program as well as programs aimed at institution strengthening (See ADB 1996a).
- In the 1997 loan pipeline is \$50 million for the Solid Waste Management (Sector) Project and \$600 million each in technical assistance for the Solid Waste Management Project and the Medium Towns Wastewater Management and Improvement Project (IRG 1994).