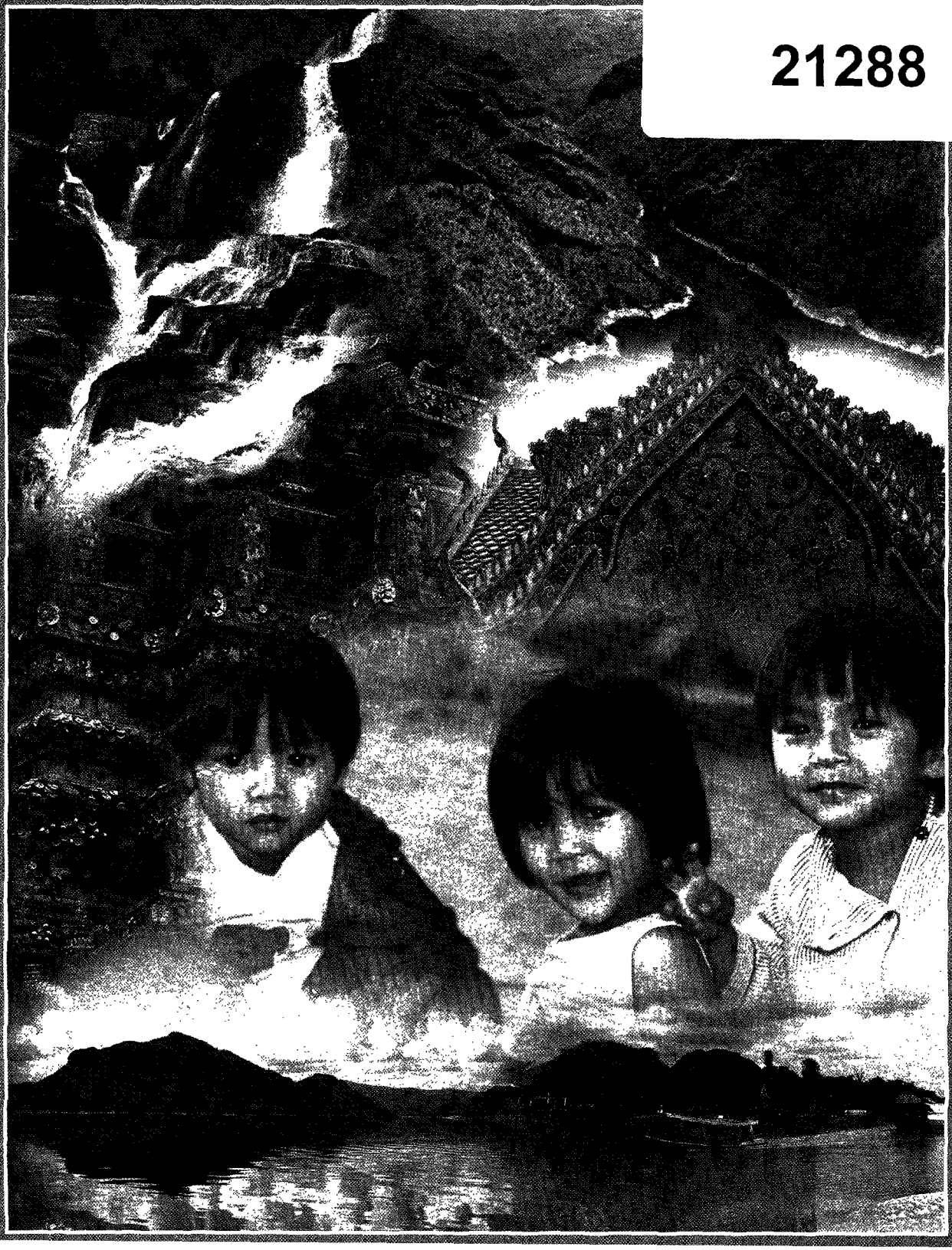
THAILAND

Building Partnerships for Environmental and Natural Resources Management



Environmental Sector Strategy Note

Thailand

Building Partnerships for Environmental and Natural Resources Management

Ministry of Science
Technology and the
Environment
Royal Thai Government
Thailand

Environment and Social
Development Sector Unit and
Thailand Country Management Unit
East Asia and Pacific Region
The World Bank

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Foreword

Thailand's abundant and diverse natural resources have sustained its people for many centuries and formed the backbone of its prosperity over the last thirty years. However, economic expansion was accompanied by serious environmental costs. As the country moves forward into the new millennium, it faces three major environmental challenges. *First*, to maintain and enhance investments that will improve the environment of Bangkok and other urban areas through reductions in air, water, and solid waste pollution. *Second*, to achieve a sustainable level of natural resource use and reverse the present degradation of its forests, marine ecosystems and watersheds. *Third*, to harness the impetus for change that has emerged from both the new constitution and the recent crisis, and to promote opportunities for local community involvement and participation in environmental protection.

This document lays out a strategic framework to translate into action Government policy on protection and management of Thailand's environment and natural resources and to identify priority areas for possible World Bank assistance. It is a result of the ongoing dialogue between the Ministry of Science, Technology, and Environment and the World Bank in consultation with other key stakeholders in Thailand—elected representatives, government officials, local communities, and donor agencies. The strategy outlined herein is intended to be dynamic, and one that will evolve with every passing year, as Thailand recovers from the crisis and addresses the relationship between economic growth and protection of its natural resources and environment.

We commend the spirit of participation and collaborative efforts that resulted in the swift yet comprehensive development of a strategy to promote environmental protection and sustainable resource use in Thailand.

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Abbreviations and Acronyms

ADB	Asian Development Bank
AIT	Asian Institute of Technology
ASEP	ASEAN Environment Program
ASEAN	Association of South East Asian Nations
AusAid	Australian Agency for International Development
ASEM	Asia Europe Meeting
BMA	Bangkok Metropolitan Administration
BMR	Bangkok Metropolitan Region
BoB	Bureau of Budget
CAS	Country Assistance Strategy
CIDA	Canadian International Development Agency
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
DANCED	Danish Cooperation for Environment and Development
DFID	Department for International Development of the United Kingdom
DEDP	Department of Energy Development and Promotion
DEQP	Department of Environmental Quality and Promotion
DIW	Department of Industrial Works
DLD	Department of Land Development
DOLA	Department of Local Administration
DSM	Demand-Side Management
DSMO	Demand-Side Management Office
ECF	Energy Conservation Promotion Fund
EF	Environment Fund
EGAT	Electricity Generating Authority of Thailand
EIA	Environmental Impact Assessment
EIDP	Environmental Institutions Development Project (proposed)
ESCAP	Economic and Social Council for Asia and Pacific
ESCO	Energy Service Companies
EPZ	Environmental Protection Zone
EU	European Union
FCCC	Framework Convention on Climate Change
GEF	Global Environment Facility
GSB	Government Savings Bank
GTZ	Gesellschaft für Technische Zusammenarbeit (German Technical Co-operation Agency)
ISO	International Organization for Standardization
IUCN	World Conservation Union
JICA	Japan International Cooperation Agency

LDD	Land Development Department
MBI	Market-Based Instruments
MoAC	Ministry of Agriculture and Cooperatives
MoF	Ministry of Finance
MoInd	Ministry of Industry
MoInt	Ministry of Interior
MoSTE	Ministry of Science, Technology, and the Environment
MoTC	Ministry of Transport and Communication
MoUA	Ministry of University Affairs
MP	Montreal Protocol
MPA	Marine Protected Area
MWA	Metropolitan Water Agency
NEB	National Environment Board
NEQA	National Environmental Quality Act
NESDB	National Economic and Social Development Board
NGO	Nongovernmental Organization
OCSC	Office of the Civil Service Commission
ODS	Ozone Depleting Substances
ODP	Ozone Depleting Potential
OECF	Overseas Economic Cooperation Fund of Japan
OEPP	Office of Environmental Policy and Planning
OPM	Office of the Prime Minister
PCD	Pollution Control Department
PEAP	Provincial Environmental Action Plan
PM_{10}	Particulate Matter under 10 microns
PSRL	Public Sector Reform Loan (proposed)
PWA	Provincial Waterworks Authority
RFD	Royal Forestry Department
RTG	Royal Thai Government
Sida	Swedish International Development Agency
SME	Small and Medium Enterprises
SSPR	Structural and Social Policies Review
TA	Technical Assistance
TSP	Total Suspended Particulates
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
WWF	Worldwide Fund for Nature

CURRENCY EQUIVALENT
(As of April 26, 1999)
Currency Unit = baht
$1.00 =36 baht

WEIGHTS AND MEASURES
1 rai = 0.16 hectare.

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The team's activities in Bangkok were coordinated by Messrs./Mmes.: Chittrakarn Bunchandran, Kanchalika Klad-Angkul and Ampai Harakunarak. Ms. Pamornrat Tansanguanwong organized consultations with civil society and parliamentarians. Ms. Katherin G. Golitzen edited the text and prepared the layout. Mr. William Gillen provided editorial assistance.

Executive Summary

Thailand's rapid economic growth over the last three decades has produced impressive achievements in people's welfare—increased income, reduced infant mortality, improved life expectancy at birth, increased literacy, and expanded employment opportunities. However, this economic expansion has been accompanied by substantial environmental costs. Nearly 50 percent of the forest cover was lost, approximately 37 percent of surface water is considered unsuitable for human consumption or agricultural use, and particulate matter (both TSP and PM_{10}) constantly exceeds ambient standards. The Government and local communities have undertaken several initiatives to address these mounting environmental problems. These include: establishing a legal and institutional framework for environmental governance, preparing a 20–year action plan, phasing out leaded gasoline, improving energy efficiency, investing in water pollution abatement and declaring a larger number of areas as protected.

The economic crisis now threatens to cut short efforts to improve environmental conditions and may even cause Thailand to negate some of the earlier gains. The impacts of the financial crisis on the environment are complex. On the positive side, the industrial downturn and reduction in consumption levels lead to less air pollution and a decrease in wastewater discharge and waste disposal. On the negative side, the financial constraints of private and public sector companies have forced industrial and municipal treatment facilities to cut back operations. The situation may be further exacerbated by delayed investment in capital renewal and cleaner technologies during the crisis. While the precise impacts of the economic crisis on the environment remain to be fully evaluated, budgetary allocations, especially for pollution abatement, energy conservation, and protected areas management, have been significantly reduced.

The World Bank's Country Assistance Strategy (CAS) of 1998 sets out a medium-term development framework for Thailand. The CAS articulates three critical elements that are required to revive growth: *renewing competitiveness, improving governance* and *sharing growth and ensuring quality of life*. It further suggests that sustainable recovery is possible only if adequate attention is

given to preserving the environment through better management of natural resources, effective enforcement of regulations, and implementation of prudent taxation policies. This provides a window of opportunity to re-examine the relationship between growth and the environment, and set the foundation for a more holistic and proactive approach to conservation and management.

SCOPE

The purpose of the Environmental Sector Strategy Note is threefold: (i) to promote dialogue and build partnerships with the Government, local communities, civil society, donor agencies, and the private sector on the major natural resource and environmental challenges facing Thailand today; (ii) to provide a framework for World Bank involvement in this crucial sector; and (iii) to contribute to the Structural and Social Policies Review (SSPR) currently under preparation.

The Ministry of Science, Technology, and the Environment (MoSTE), the Ministry of Agriculture and Cooperatives (MoAC), and the Department of Industrial Works (DIW) are the main counterparts for this effort. The Strategy Note is the outcome of desk and field reviews and extensive consultation undertaken over a three-month period. It has directly benefited from previous and ongoing studies of the World Bank and other donor agencies. The Strategy Note elaborates upon and reinforces the environmental objectives specified in Thailand's Eighth National Economic and Social Development Plan (1997–2001) and the above-mentioned CAS. An abridged version of the Strategy Note has been provided to the counterparts, and national consultation is currently taking place. The complete Strategy Note will be jointly published in English and Thai. MoSTE will lead, direct and coordinate implementation of the strategy.

KEY CHALLENGES

An overview of environmental trends and responses is summarized in Chart 1. From an assessment of these trends, the following emerge as the major environmental and natural resource challenges facing Thailand today:

- *Restructuring institutions:* The protection and management of natural resources and other environmental functions are spread across many ministries. Public institutions are highly segmented with limited coordination among them. This results in overlapping functions and responsibilities. A broad consensus is emerging to review and streamline these institutional arrangements.
- *Enforcing environmental regulations:* The implementation of regulatory measures has suffered from weak monitoring and enforcement. Existing command-and-control measures have not been particularly effective, and efforts are underway to introduce market-based instruments (MBIs). In addition to providing incentives, such instruments will also improve firms' compliance with environmental standards. Rising community pressure to ensure compliance in the private sector, and the introduction of public disclosure tools can also play an important role.
- *Managing water resources and improving water quality:* Water scarcity is becoming a critical problem in major river basins. One third of surface water bodies are of low quality, including the lower reaches of the Chao Phraya and Thachine rivers. Increased volumes of mu-

nicipal and industrial waste are the main culprits. The separation of wastewater management from water supply as a municipal service function in the Bangkok Metropolitan Region (BMR) and a lack of cost-recovery in water supply and quality improvements impede public and private sector investments in wastewater management. Watershed management remains a planning principle that has not been effectively translated into action.

- *Improving air quality in Bangkok:* While progress has been made in reducing atmospheric lead, rising ozone and hydrocarbon concentrations and particulate matter continue to be problematic. Poor air quality could undermine the competitiveness of Bangkok as an attractive regional investment center. Thus, sustained and increased investments need to be made in fuel quality improvements, inspection and maintenance of vehicles, transport planning, and the enforcement of tighter vehicle emissions standards.

- *Improving the management of protected areas and accelerating reforestation efforts:* Although deforestation has slowed down significantly in recent years, reforestation remains well below target levels. Large losses of dryland forests, coastal mangroves and wetlands have contributed to declines in biodiversity. While significant additions to the protected area system are proposed, existing areas suffer from a lack of management resources.

- *Arresting soil erosion:* Land degradation, in particular soil erosion, impacts close to half the country's land, and is especially problematic in the country's upland areas. Salinization is also a severe problem in the northeast and in the south along the coast.

- *Improving coastal zone management:* Marine fisheries have become heavily depleted over the past twenty years as observed from a significant reduction in fishing yield. Reliance on coastal aquaculture and freshwater fish culture has increased dramatically during this time. As a result of rapid coastal development, almost half the mangrove forest area has been lost.

- *Managing solid and hazardous waste:* A comprehensive national program is needed to address the worsening problems of solid and hazardous waste production and disposal in cities, towns and industrial locations in an environmentally sound and cost-effective manner.

- *Planning the development of secondary cities:* Phuket and Chiangmai are beginning to experience major environmental problems because inadequate consideration was given to environmental aspects in physical planning and provision of infrastructure. The growth of these and other cities should be guided by sound environmental planning principles.

Chart 1: Overview of

Issue	Overall Severity	Trend
Declining water quality in Chao Phraya	High	• 37% of surface water bodies classified as low quality, including Chao Phraya and Thachine
Increasing water scarcity	High	• Per capita consumption doubled • Water scarcity increasing, worse in dry periods
Declining air quality in BMR	High	• Ambient levels of lead, SO_x, NO_x and CO reduced significantly • PM_{10}, TSP, ozone and HC exceed standards
Loss of critical habitats	High	• Significant losses reported • About 100 species of plants classified as endangered; 900 considered rare and vulnerable
Watershed degradation	Medium	• Increase in soil erosion and downstream sedimentation
Declining marine and fresh-water resources	Medium	• Significant reduction in catch per unit effort over 20 years • 50% reduction in mangroves between 1961–1993
Land degradation	Medium	• Increasing soil erosion in upland areas • Salinization on southern coast
Increasing solid and hazardous waste	Medium	• Per capita urban household waste generation 0.5–1 kg/day • Industrial units in BMR generated 2 M tons of hazardous waste in 1997
Declining forest cover	Low	• Total forest cover declined from 53% of total land area in 1961 to 25% in 1998. • Rate of deforestation slowed from 0.9%/year, pre-1989, to 0.2%/yr between 1995–1998.

Environmental Trends and Responses

Causes and Relative Contribution*	Response	Donor Activities
• Domestic sewage (H) • Industrial effluent (H) • Agricultural runoff (H)	• $550M committed for wastewater collection / treatment in Bangkok metropolis in 1998 • Pollution discharge standards introduced	ADB; AusAid; DANCED
• Irrigation (H) • Domestic (M) • Industrial (M) • Drought (L)	• Policy, institutional and regulatory framework for integrated water resources management completed • Comprehensive water management strategy completed	ADB; CIM; DANCED
• Transport (H) • Industry (M) • Power (M) • Indoor air pollutants (L) • Garbage burning (L)	• Unleaded gasoline introduced • Improvements in traffic management • Mass transit • Dust control measures • Revisions to regulatory enforcement	DANCED; GTZ; NEDO; Sida; World Bank
• Deforestation (H) • Pollution (H) • Fishing practices (H) • Economic incentives (M) • Poaching (M)	• Extended and representative protected area system established (50 M rai), covering 16% of total land area	AusAid; BDW; BGR; CIDA
• Land use planning/ management (H) • Land conversion for agriculture (H) • Encroachment in uplands (M) • Land tenure (M)	• Watersheds have been classified and mapped • Intended land use specified and regulated	BDW; BGR; CIDA; DANCED; JICA; NIDO; World Bank
• Effluents and agricultural runoff (H) • Fishing practices (H) • Mangrove conversion (M)	• Programs developed for sustainable aquaculture and marine fisheries management • Targets established for mangrove reforestation and conservation	CIDA; DANCED; DFID
• Land conversion for agriculture (H) • Soil erosion (H) • Land tenure (H) • Salinization (M)	• Improvements in land use management / planning • Forest encroachment reduced by designating appropriate areas for agriculture • Pilot soil conservation projects	AusAid; CIM; JICA
• Industry (H) • Households (H)	• Improvements in garbage collection • Pollution prevention techniques introduced for hazardous waste • Sanitary landfills and treatment facilities	ADB; BGR; CIM; DANCED; EU; GTZ; JICA; USAID
• Logging (H) • Protected areas management policies (H) • Encroachment (L) • Inundation (L)	• Established forest classification • Reforestation targets set at 40% of land area • Investments in 1996 – as a percent of GDP	AusAid; DANCED; JICA; World Bank

* H = High; M = Medium; L = Low

PRIORITIES FOR WORLD BANK ASSISTANCE

Priorities for World Bank assistance have been identified through extensive consultations with the Royal Thai Government (RTG) and other partners, and also through review of relevant analytical work from previous World Bank and non-World Bank studies. A five-step approach has been adopted. The first step assesses the key environmental and natural resource trends and their causes. Necessary reforms are identified in the second step. The third step defines the objectives and scope of collaboration between the Government and the World Bank, which serves as the basis for analyzing and identifying priorities for World Bank assistance in the fourth step. The final step lays out the proposed World Bank assistance strategy.

The proposed strategy consists of two tracks: (i) *functional improvements* and (ii) *priority investments*. It is intended that each track support the other; for example, some institutional reforms will strengthen Government capacity to implement an investment project more effectively. As manifested in the Chao Phraya River Basin and in Bangkok, environmental problems remain a priority because of complicated and weak institutional arrangements and structures. The specific elements of the strategy are therefore interdependent. Tackling these challenges together will result in greater likelihood of a successful outcome.

With regard to *functional improvements*, the strategy identifies three areas of institutional and policy reforms: (i) strengthening *environmental governance* through restructuring and reengineering the environmental agencies to improve functional efficiency, strengthening the enforcement and compliance mechanism, supporting decentralization by making the Provincial Environmental Action Plan (PEAP) process more effective, and building technical, managerial and analytical capacity; (ii) improving the sustainability of *environmental financing* by transforming the Environment Fund into a revolving mechanism, supporting the creation of MBIs for improved pollution management, and introducing cost-recovery measures for environmental services; and (iii) enhancing opportunities for *community involvement* by supporting communities in improving their local environment, promoting environmental awareness through information dissemination, and improving disclosure of environmental information to the general public.

The strategy recommends that *priority physical investments* be made in Bangkok and the Chao Phraya River Basin. This includes:

- Providing assistance to the Bangkok Metropolitan Administration (BMA) area to improve its environmental quality through targeted investments, policy reforms, and capacity building to control air and water pollution. This support would consist of two proposed lending operations as well as non-lending advisory services.
- Supporting an improved water management program in the Chao Phraya Basin through enhancements in the legal and regulatory framework for water management; establishment of a dedicated river basin organization to plan and implement sound policies and investments; improvement in the management and administrative capacity of key water agencies; and priority investments in irrigation in-

frastructure and remedial works on dams at risk of failure.

Activities identified for World Bank involvement include a combination of lending instruments, non-lending advisory services, and grants through the Montreal Protocol and Global Environment Facility to meet global environmental objectives. These are summarized below in Chart 2. Some of the operations will be cofinanced with other donors. OECF has formally committed its participation for the proposed operations in Bangkok. The non-lending advisory services will improve skills, knowledge and expertise.

Chart 2. Proposed World Bank Activities

Strategic Themes	Proposed World Bank Involvement (2000–2002)	
	Lending Operations	**Non-lending Advisory Services**
Environmental Governance	Proposed Public Sector Reform Loan (PSRL) Proposed Environmental Institutions Development Project (EIDP)	Seminars and workshops on alternative institutional models and decentralization
Environmental Financing	Re-capitalization of the Environment Fund within the context of PSRL	Design of an effective pollution charge scheme Developing financing mechanisms for local environmental services and cost-recovery
Community Participation	Possible expansion of the scope of the Social Investment Project	ASEM-funded technical assistance for community-based environmental initiatives in four urban centers
Priority Investments:		
Bangkok Urban Environment Program	Proposed Bangkok Air Quality Management Project; and Proposed Bangkok Waste Management Project	
Chao Phraya River Basin Management	Proposed Natural Resources Management Project	

Introduction

The purpose of the Environmental Sector Strategy Note is to promote dialogue and build partnerships with the Government, local communities, civil society, donor agencies, and the private sector on the major natural resource and environmental challenges facing Thailand today. Unlike some other donors, the World Bank has had limited presence in the environmental arena in Thailand (see Annexes A and E) and therefore an underlying objective of the dialogue is to set the stage for longer-term collaboration in environmental management and planning. This Strategy Note sets out a framework for World Bank involvement in the sector in the immediate to medium term. It elaborates upon and reinforces the environmental objectives specified in Thailand's Eighth National Economic and Social Development Plan (1997–2001) and the World Bank's 1998 Country Assistance Strategy (CAS).

The Strategy Note is organized in six sections. Section 1 provides a brief introduction to the changing economic and environmental context, and Section 2 describes the policy and institutional framework in Thailand. Section 3 analyzes environmental trends and priorities in the green, blue, and brown agendas. Section 4 presents emerging challenges and the approach used in setting priorities for World Bank involvement. Section 5 describes a *proposed* environmental strategy that includes potential World Bank operations. Section 6 offers a framework for benchmarking progress.

The preparation of the Strategy Note is based on desk and field reviews over a three month period and is intended to offer a simple, practical approach to discussing natural resources and the environment with a broad range of stakeholders, and to developing a strategy for World Bank assistance. The Strategy Note has benefited directly from ongoing work by the World Bank in preparing assistance strategies in the rural development and urban transport sectors[1] and from discussions

1 The World Bank is concurrently developing a *Rural Development Strategy* and *Urban Transport Strategy* for Thailand, soon to be completed.

with other multilateral agencies[2] and bilateral donors. The Ministry of Science, Technology, and the Environment (MoSTE), the Ministry of Agriculture and Cooperatives (MoAC), and the Department of Industrial Works (DIW) are the principal counterparts for the Royal Thai Government (RTG).

In preparing this Strategy Note a *participatory approach* has been followed. An initial stakeholder consultation chaired by MoSTE was held in January 1999; thereafter consultations have been held with the Minister, Permanent Secretary and senior staff of MoSTE, its environmental agencies and other national agencies. An abridged version of the Strategy Note has been provided to the counterparts, and MoSTE is leading the national consultation that is currently taking place. The Strategy Note will be jointly published in English and Thai. MoSTE will lead, direct and coordinate implementation of the strategy.

2 The ADB has recently completed an "Environment Profile of Thailand" that comprehensively describes the environmental context and challenges.

1

A Changing Economic and Environmental Context

Three decades of exceptional growth. The performance of Thailand's economy was remarkable in the three decades prior to 1997. Between 1965 and 1980, growth averaged 7.3 percent annually; this accelerated to 7.8 percent during 1980–1995—roughly twice the growth rates of other low- and middle-income developing countries. Per capita GDP more than tripled. The number of Thai citizens living below a poverty line of $2 per day fell from 42 million to 16 million between 1975 and 1992. This rapid and sustained economic growth also produced impressive achievements in people's welfare—with reduced infant mortality, improved life expectancy at birth, increased literacy and expanded employment opportunities.[3]

Poverty and environmental degradation persist. Despite the important reduction in absolute poverty, the benefits of growth were not shared equitably. This masked continued poverty in large segments of Thai society, a widening inequality of incomes and significant gaps in the Government's social safety nets. Thailand's economic development also resulted in very large environmental costs. Forest cover was reduced from 53 percent in 1961 to 25 percent in 1998.[4] Approximately 37 percent of surface water has been assessed as of low quality (unsuitable for human consumption or agricultural use).[5] Total suspended particulates (TSP) and particulate matter under 10 microns (PM_{10}) constantly exceed ambient standards in Bangkok.[6] The destruction of forests increases the risk of erosion, floods, and elimination of natural habitats; water pollution threatens health and fisheries, and precipitates depletion of underground water resources; congestion and pollution in cities affect human health, and accelerate the deterioration of infrastructure.

3 See *Country Assistance Strategy for Thailand*, June 1998, for more details.

4 Environmental Statistics of Thailand 1998. National Statistic Office, Office of the Prime Minister.

5 Ibid.

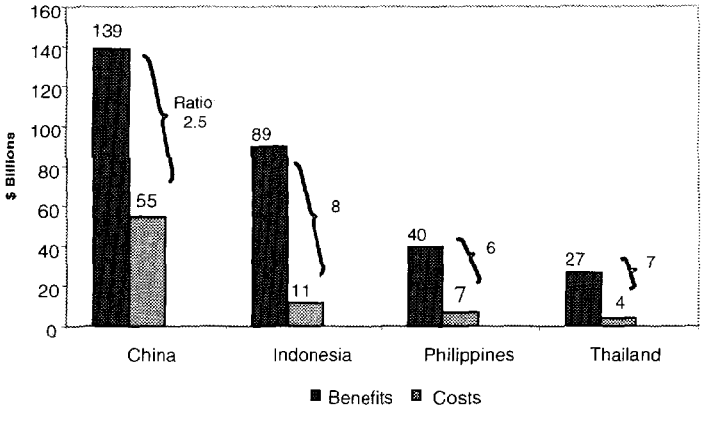
6 Pollution Control Department reports.

COST OF INACTION

The benefits of bluer water... Earlier studies[7] conducted by the World Bank indicate that the health benefits of providing universal access to clean water and sanitation to the Thai people would be significant. Thailand may also gain considerably from such investments in terms of competitiveness and productivity. Studies of household spending and water markets in urban areas in Thailand, Indonesia, Philippines and China indicate that most households without access to safe water pay up to 10 percent of their annual income for this water—often more than the cost of providing piped or boiling water. Economic gains can also be achieved through improvements in management of water resources for irrigation and industrial use. Poor management exacerbates extraction of groundwater and deterioration in groundwater quality.

Under a medium investment scenario in Thailand examined by the World Bank, annualized costs for implementing urban sanitation and water pollution controls would amount to $0.45 billion in 2000, $0.66 billion in 2005 and $1.76 billion in 2020.[8] These investments would include improvements in water supply and sanitation access and water pollution control. Health and economic benefits generated in such a scenario are estimated at $2.9 billion in 2000, $5.2 billion in 2005, and $8.9 billion in 2020. These benefits are largely based on evaluation of reductions in infant mortality. The present value of these benefits and costs over a 20–year time horizon are depicted in Figure 1, which indicates that for every $1 invested in water and sanitation, almost $7 in imputed health benefits are attained. This benefit-cost ratio is similar to that for Indonesia and the Philippines but significantly greater than for China.

Figure 1. Net Benefits for Urban Sanitation and Water Pollution Controls



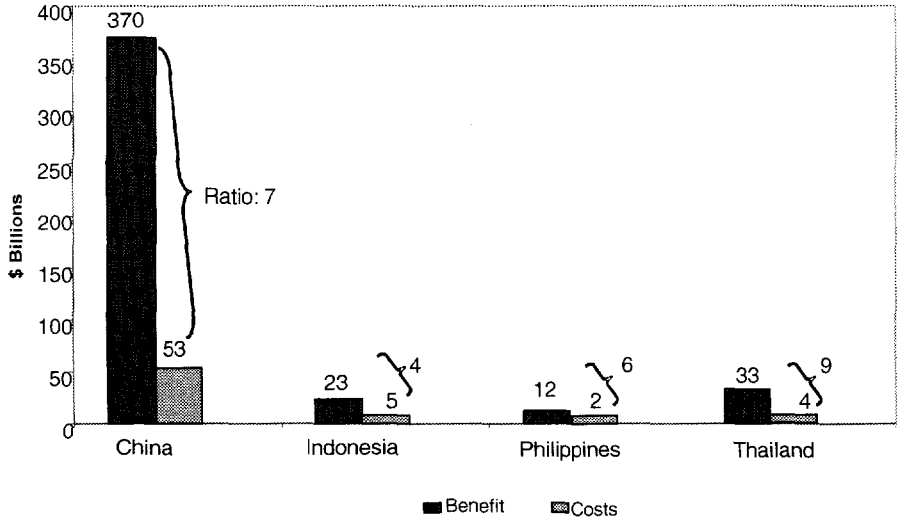
...And clearer skies. In the early 1990s the health costs of exposure to dust, lead, particulates, CO_2, and CO emissions in Bangkok were estimated at 8–10 percent of urban annual income. Despite major improvements over the last several years (such as a shift to unleaded gas), the costs of damage to human health and the economy are expected to rise to 20 percent by 2025. The same World Bank study also concluded that the benefit-to-cost ratio for investments in air pollution prevention and control is close to nine. Under a medium investment scenario the total annualized costs of implementing air

7 *Can the Environment Wait? Priorities For East Asia*, World Bank, 1997.

8 Estimates are in 1997 dollars.

pollution controls would be about $400 million in 2000, $660 million in 2005, and $1.5 billion in 2020 with corresponding benefits of $2 billion in 2000, $4.7 billion in 2005, and $25 billion in 2020. Figure 2 illustrates the present value of these benefits and costs over a 20–year horizon. The benefit-cost ratio for Thailand is considerably higher than World Bank estimates for other countries in the East Asia region.

Figure 2. Net Benefits of Air Pollution Control



IMPACT OF THE CRISIS

The economic crisis and the environment. The economic crisis and related structural adjustment program have had several impacts on the environment—some negative and others positive[9] (see Box 1 below for an overview of impacts on the East Asia region). Attempting to aggregate the overall effect of the crisis and related policy reforms on the environment in Thailand is not a simple task. Isolating impacts resulting specifically from the crisis, comparing different "types" of impacts (such as reduction in industrial activity vs. increased migration to rural areas), and recognizing that several of these impacts may not yet have manifested

9 Markandya, *Environmental Implications of the Financial Crisis in Thailand*, ADB (1998), suggests that the causes of these impacts stem from the following: (i) changes in investment allocations for environmental protection; (ii) changes in quality of the ambient environment as a result of reduction in economic activity, changes in employment in general and rural/urban migration in particular; (iii) effects of the alterations in relative prices, making the production of rice, export of natural resources, and tourism more attractive; and (iv) policies induced by the structural adjustment program (such as privatization, increased cost-recovery for environmental services, introduction of new taxes with environmental implications, etc.).

Box 1
The Environmental Implications of the Economic Crisis in East Asia

Before the current economic crisis, people throughout the region were realizing that a "grow now, clean up later" paradigm was resulting in unacceptable environmental costs. Environmental degradation was costing the regional economies an average of nearly 5 percent of GDP annually. This realization prompted efforts throughout the region to improve environmental management, and countries invested between 0.5 and 1 percent of GDP on environmental protection. However, the crisis now threatens to cut short those efforts.

The impact of the financial crisis on the environment is a story of both good and bad news. On the positive side, what is bad for the economy turns out to be good for the environment. Industrial downturn and reduction in consumption levels lead to less air pollution and a decrease in waste generation. Yet these positive impacts are fairly small and temporary. Without interventions specifically aimed at curbing emissions, air and water pollution will surpass pre-crisis levels soon after economic recovery. In addition, in terms of industrial pollution, the positive impacts of emission reduction are often offset by the combined negative effects of reduced operation and maintenance of pollution control equipment and less stringent regulatory control.

Despite currency depreciation and the desire to increase exports, the timber sector is experiencing decreased demand in the short term. In the second half of 1997, major regional export markets for hardwood, plywood, and logs collapsed overnight. Farmers and communities who depend on resource extraction from protected areas seem to have weathered the crisis relatively better because of less dependence on the market economy. Others, such as cash croppers, including rice producers, have also benefited from the changes in relative prices.

On the negative side, the financial constraints of private and public sector companies have forced industrial and municipal treatment facilities to cut back operations. The situation is likely to be further exacerbated by delays in investments in capital renewal and cleaner technologies. Coastal and mangrove resources have been more threatened by domestic and industrial effluent than by additional fishing pressure; in some cases, the sharp rise in production costs has put small fisherman out of business.

Budgetary allocations for the environment have been affected differently across the region. In Indonesia, environmental agencies have generally absorbed substantial budgetary cuts. Budgets have also been reduced in Thailand, especially for pollution control and energy conservation, although some agencies have not been affected. In the Philippines, the budget of the Department of Environment and Natural Resources suffered a 25 percent mandatory reserve on all expenditures other than personnel and debt service and the suspension of tax subsidies to government units. The Government of Korea's budget for environment shrunk 0.3 percent in 1998 from 2.8 percent in 1997. In Malaysia on the other hand, funding for environment actually increased in 1998.

In the current context, the important challenge is to ensure that regional economies do not relegate environment to a secondary status on the policy agenda and backpedal into a spiral of the old "grow first, clean up later" approach. Priority should be given to restoring growth to reverse the decline in personal and national incomes and to continue the battle against poverty. At the same time, however, recovery programs can provide an opportunity to remove environmentally harmful subsidies, to promote competitive gains through energy savings and resource optimization, and to create a framework for implementing positive environmental fiscal incentives.

As growth resumes, the choice should not be between environment and development; both are needed. The challenge is to make recovery work for the environment, not against it, so that the financial crisis may be remembered as a window of opportunity for improved environmental quality in East Asia.

Source: *Environmental Implications of the Economic Crisis and Adjustment in East Asia. World Bank. January 1999.*

themselves complicates this analysis.[10] However, a number of preliminary observations are worth noting regarding changes in budgetary allocations for the environment and changes in environmental trends.

Government spending for environmental protection has declined. Overall Government budget for environmental investments has been reduced significantly, thereby suggesting that fewer investments in conservation and protection activities are being made. Preliminary findings of an ongoing study by the Kenan Institute in Bangkok, summarized in Table 1, indicate that budget shrank by 20 percent for fiscal year 1998. See also Annex D.

Moreover the regulator (in this case the Ministry of Industry) may express even greater reluctance than usual to enforce compliance with environmental standards. Hence, while industrial production has fallen, pollution intensity (pollution per unit of output) may well have increased. The effect of the combination of these two phenomena on aggregate pollution load is still unclear. Furthermore, pollution load is expected to increase significantly as industrial production initiates its recovery.

- If financing operation and maintenance costs of public environmental investments such as wastewater treatment plants and solid waste management was a serious difficulty during the years of economic prosperity (as is generally acknowledged), such difficulties have likely increased during the period of economic slowdown. We may therefore expect an increase in discharges of untreated municipal waste.

Table 1. Budget Allocation for Environmental Protection 1996 - 1998

Sector	1996 (million Baht)	1997 (million Baht)	1998 (million Baht)
Water Pollution	5,948	7,257	6,584
Air & Noise Pollution	472	447	164
Solid & Hazardous Waste	1,193	1,302	1,155
Others (Management)	2,386	2,391	405
TOTAL	**9,999**	**11,397**	**8,308**

Source: Kenan Institute

Impacts on the environment and natural resources. In small part due to changes in budgetary allocation for environmental protection, the crisis appears to have had the following effects:

- While a large number of industrial facilities have closed down, those remaining in production do not necessarily have the same resources to continue operating their pollution control equipment.[11]

10 Refer to Markandya (1998) for a systematic review of these impacts.

11 This phenomenon was recently observed in Indonesia. While the absence of data does not allow us to test a similar hypothesis in Thailand, there is no indication that a different phenomenon would be taking place. Anecdotal evidence also suggests an increase in illegal disposal of toxic waste by polluters seeking to avoid the costs of proper disposal.

- The impacts of El Niño, forest fires, and the 1998 drought have made it more difficult to understand the consequences of the crisis for natural resources in Thailand. Preliminary findings suggest that simplistic predictions of natural resource degradation—caused by intense reverse migration from urban to rural areas, forest encroachment, change in land use and increased exploitation of coastal and freshwater resources—do not appear to have been realized. In some cases, the environmental impact appears positive, which may in part be a result of the strong depreciation of the baht. Often the crisis has merely nudged pre-existing trends slightly higher or lower.
- Farmers and communities relying less on the market economy may have weathered the crisis relatively better at least for now by benefiting from changes in relative prices. However the poorest farmers, many of whom practice illegal farming in protected areas, are not self-sufficient in rice and buy in local markets, have been hit very hard by the increase in domestic prices for rice and other commodities.

ENVIRONMENT AND ECONOMIC RECOVERY

Preservation of the natural environment is critical to sustainable recovery. The World Bank's CAS of 1998 sets out the medium-term development framework for Thailand. The CAS articulates three important elements that are required to revive growth: *renewing competitiveness, improving governance,* and *sharing growth and ensuring quality of life*. It further argues that sustainable recovery is possible only if adequate attention is given to preserving the natural environment, through better management of natural resources, effective enforcement of regulations, and implementation of prudent taxation policies. This provides a window of opportunity in which to re-examine the relationship between growth and the environment, and set the foundation for a more holistic and proactive approach to conservation and management.

Renewing competitiveness. The argument that stricter environmental regulations and voluntary standards (and thus increased protection of the environment) enhance competitiveness and growth is becoming more widely accepted. This challenges the conventional view of a strict tradeoff between the environment and competitiveness. Indeed, properly designed environmental standards can trigger innovation or induce the adoption of more efficient technologies. These gains in efficiency (reduced production costs) may more than offset the cost of complying with stricter environmental standards. Here the focus is on environmental standards that are properly designed. Reference is explicitly made to instruments that allow the greatest level of flexibility to the polluter, such as *market-based instruments* (MBIs). The adoption of MBIs—which in Thailand would represent an important departure from current approaches (command-and-control)—could therefore go hand in hand with the renewal of Thailand's industrial competitiveness. These instruments are discussed in greater detail in Section 6.

Another hypothesis illustrating the effects of standards is centered on the

implementation of ISO 14000.[12] Besides improving manufacturing efficiency and environmental compliance, it also facilitates a behavioral shift by promoting greater collaboration between employees and owners within a manufacturing unit. Though the guidelines are intended as a voluntary and internal management tool, there is concern that ISO standards may be used as non-tariff barriers overseas. Nevertheless, a growing number of firms in Thailand are actively complying with ISO 14000 standards—thereby undertaking "globally acceptable" environmental policies and practices—in order to maintain their access to overseas markets.[13]

The above two arguments provide evidence contradicting the conventional belief that properly designed environmental standards will encourage the flight of industries to countries with lower or non-existent ones. Indeed recent research does not support this "pollution haven" hypothesis. Hence the implementation of properly designed environmental standards aimed at improving environmental quality may simultaneously facilitate rather than impede the renewed long-term competitiveness of Thailand's important economic sectors.

Improving governance. In Thailand as in many other developing countries, the overall environmental governance structure has exhibited a large number of deficiencies, including overlapping functions, poor delineation of responsibilities among institutions, and limited human and technical capacity at lower echelons. To a large extent, the economic downturn has exposed these weaknesses even more strongly. In this context, improving environmental governance is of crucial importance and remains a significant challenge. Better governance will not only improve overall efficiency of environmental management in the country, it will also send strong signals to private agents that protection of the environment is a key component for recovery and sustained growth. Such signals are necessary to bring about changes in these agents' behavior, which recognize that environmental quality is valuable and must be protected for the benefit of all.

Sharing growth and enhancing quality of life. Initiatives to protect the environment would enhance quality of life for the Thai people, especially for those most disadvantaged. This argument is based on the belief that a degraded environment adversely affects human health and threatens the livelihood of the rural and urban poor—in turn exacerbating inequity in the country. Among the "brown" issues, air pollutants, groundwater contamination, and solid and hazardous wastes have increased mortality and morbidity, most notably in the Bangkok Metropolitan Region (BMR). A recent study indicated that the Bangkok population has been adversely affected by particulate matter air pollution—with an estimate of 5,000 premature deaths each year.[14] Of particular importance is

12 The ISO 14000 series, a project of the International Organization for Standardization (ISO), is a collection of voluntary consensus standards that have been developed to assist organizations to achieve environmental and economic gains through the implementation of effective environmental management systems.

13 As of March 17, 1999, 121 facilities in Thailand were certified ISO 14000; 41 of these were in the electronics sector.

14 Hagler, Bailly. "The Health Effects of Particulate Matter Air Pollution In Bangkok," March 1998.

the fact that, as shown by the study, the urban poor bear most of the burden of a degraded and polluted environment.

Deforestation, land degradation and over-exploitation of natural resources (such as fisheries) have together reduced livelihood options available to many rural villagers. Between 1961 and 1998 forest cover decreased to about 25 percent.[15] Loss of forest cover and inappropriate land use practices have resulted in increased soil erosion and sedimentation of waterways. Over-harvesting of marine fisheries has resulted in a tenfold decrease in catch-per-unit-effort, from 265 kilograms per hour in 1970 to 25 kilograms per hour today[16]—in addition to significant depletion of fish stocks and degradation of the marine habitat. Over-fishing is largely due to overcapitalization of the fisheries sector stimulated by open access, poor enforcement of regulations, and input subsidies on fuel and fishing gear.[17] The decline in catch-per-unit-effort has caused a decrease in fishers' income felt most severely by small-scale fishers (who already tend to be disadvantaged) and shows the need for alternative livelihood opportunities to bring fishing effort down to sustainable levels.

Sustained growth: efficiency, equity, and transparency. As was identified elsewhere,[18] for Thailand to rise out of the present economic crisis and lay the foundation for sustainable growth, there is a need to confront systematically the challenges of efficiency, equity, and transparency.[19] While it is usually understood that these challenges apply to the management of public resource mobilization and expenditures, they apply equally to management of the environmental sector. Greater *efficiency* means that objectives of environmental quality must be reached with a minimum of public resources, that the proper role of the public sector in providing environmental services must be reexamined, and that environmental governance must be improved. Greater *equity* implies that public investment in pollution control and environmental and natural resources management must reach those in society among the least well off. Finally, greater *transparency* requires a larger degree of decentralization, environmental awareness, and public participation in issues pertaining to environmental management. Addressing these challenges will be key to renewed and sustained economic growth.

15 Royal Forestry Department report on remote sensing interpretation, 1996.

16 The Department of Fisheries estimated that around 54,538 fishing boats were operating in Thailand in 1995.

17 FAO/RAPA, *Socio-Economic Issues in Coastal Fisheries Management: Proceedings of the IPFC Symposium*, Bangkok, November 1993.

18 World Bank, Thailand Public Finance Review, Concept Paper.

19 "Among the widely recognized barriers to growth in competitiveness were serious deficiencies in infrastructure development and environmental management, and a policy regime at the micro level which was too much geared to creating and preserving rents rather than fostering market competition." Source: Frank Flatters, *Thailand, the IMF and the Economic Crisis: First in, Fast out?* March 1999.

2

Policy and Institutional Framework

An early beginning. Thailand has developed over the years an extensive legal and regulatory framework for the administration and management of natural resources and the environment (see Annex C). In the late 1960s, concerns about the adverse effects of industrialization emerged. The Factory Act (1969) responded to these concerns by assigning responsibility for industrial pollution control to the Ministry of Industry (MoInd). The first comprehensive legislation on environmental protection was the Enhancement and Conservation of National Environmental Quality Act (NEQA), which was enacted in 1975. This landmark Act established the National Environment Board (NEB) as the main policy, planning and coordination agency, and the Office of the NEB as its secretariat. The National Economic and Social Development Board (NESDB) and MoSTE were to contribute to the planning process. Ambient quality standards and guidelines for the use of Environmental Impact Assessments (EIAs) were also established in this Act.[20]

Revisions to the NEQA. In response to growing and complex environmental problems, the NEQA was amended in 1992. In the revised NEQA, the NEB was upgraded to ministerial level and its secretariat separated into three departments within MoSTE. The Prime Minister now chairs the NEB. Other major changes include: decentralization of certain environmental functions,[21] designation of priority environment zones, and creation of an Environment Fund (EF). The law also called for the preparation of (i) a 20–year planning framework for the environment (See Box 2); (ii) periodic five–year environmental quality management plans; and (iii) Provincial Environmental Action Plans (PEAPs).

A proliferation of environmental agencies. As the primary administra-

20 *Thailand—Mitigating Pollution and Congestion Impacts in a High-Growth Economy*, World Bank, 1994.

21 *Decentralizing Environmental Management—Participatory Approach*, Thailand Environment Institute, 1995.

Box 2.
Policy and Perspective Plan for Enhancement and Conservation of National Environmental Quality - 1997–2016

Commonly referred to as the 20–Year Environment Plan, the *Policy and Perspective Plan for Enhancement and Conservation of National Environmental Quality* was prepared by the Office of Environmental Policy and Planning on a directive from the NEB and approved by the RTG on November 26, 1996.

The 20–Year Plan consists of six main policy areas:

(1) Policy on Natural Resources;
(2) Policy on Pollution Prevention and Eradication;
(3) Policy on Natural and Cultural Environment;
(4) Policy on Community Environment;
(5) Policy on Environmental Education and Promotion; and
(6) Policy on Environmental Technology.

It is intended to be the "blueprint" for integrating management and conservation of natural resources and enhancement of environmental quality with sustainable economic and social development. Government agencies and state enterprises will implement the 20–Year Environment Plan according to the Enhancement and Conservation of National Environmental Quality Act of 1992 by formulating the Environmental Quality Management Plan and Provincial Environmental Action Plans. In addition to prioritizing environmental problems, the Plan promotes the participation of local organizations and NGOs at all levels in the administration and management of natural resources, monitoring and compliance of environmental regulations and promotion of environmental awareness.

tive body charged with environmental protection in Thailand, NEB proposes laws, recommends fiscal measures, prescribes standards, and approves annual national and provincial environmental quality management plans. Implementation of environmental and natural resource responsibilities has been assigned to several Government ministries and agencies[22] including MoSTE, MoAC, MoInd, Ministry of Interior (MoInt), Ministry of Communications, and the National Energy Planning Office (see Box 3). The large number of institutions involved in protection of the environment and management of natural resources has resulted in overlapping functions, unclear delineation of responsibilities, and overall reduced effectiveness to implement plans and programs and enforce laws related to environmental quality.

22 See *Environment Profile, Thailand*, ADB, 1999 for more details.

An emphasis on decentralization and a shift to local governments. The 1992 revisions to the NEQA decentralized some environmental functions to the provincial level. Provincial authorities (through the Department of Local Administration) are now responsible for the annual preparation of a PEAP if the province contains a designated Environmental Protection Zone (EPZ). However, the Governor of each Province remains appointed from the central administration. This has raised questions on the meaningfulness of decentralization to locally elected or appointed officials. Often the Government and local officials find themselves in disagreement on environmental issues. Active involvement of local communities in the planning process also remains a challenge.[23] In 1997,

23 The Thailand Environment Institute has repeatedly emphasized the importance of people participation in its initiatives.

amendments were made to the National Constitution that established decentralization as a cornerstone of Government policy. Section 290 of the new Constitution states that "local administrative organizations have powers and duties to manage, preserve and exploit natural resources and environment in the area of the locality." This has substantially shifted new responsibilities to local governments (below the provincial level), which often have little experience or capability to handle these responsibilities. Assessment of the readiness of local governments to assume these responsibilities and identification of opportunities for local capacity building are therefore immediate priorities.

Box 3
Overview of Environment and Natural Resource Functions in the RTG*

Ministry of Science, Technology, and the Environment (MoSTE). The three agencies within MoSTE assigned to carry out the NEB's mandate are the Office of Environmental Policy and Planning (OEPP), Pollution Control Department (PCD), and Department of Environmental Quality and Promotion (DEQP). OEPP's responsibilities are to formulate the national policy and plan for the environment, assist in preparation of PEAPs, monitor compliance with international agreements and commitments, and evaluate EIAs for private and public projects. PCD designs national emission and ambient standards, monitors environmental quality, develops methodologies for pollution control and enforcement, and responds to public complaints related to pollution. DEQP focuses on cooperation and coordination among Government agencies, state enterprises and the private sector and coordinates dissemination of information and data to promote public awareness and knowledge about the environment.

Ministry of Agriculture and Cooperatives (MoAC). Various cabinet resolutions and legislation charge MoAC with management of key natural resources and habitats. For example, the Royal Forestry Department (RFD) is assigned responsibility for management of forests, mangrove areas, and watersheds, as well as management of both terrestrial and marine protected areas. The Department of Fisheries is charged with management of aquatic resources. Soil conservation is the responsibility of the Land Development Department, which undertakes land surveys to analyze suitability for development, and on this basis implements a land classification system and formulates indicative land-use plans. The Natural Resources and Biodiversity Institute formulates policies and programs for natural resources management, coordinates natural resource activities across MoAC's agencies, other Government agencies and stakeholder groups, and maintains a natural resource information base.

Ministry of Industry (MoInd). Besides monitoring individual factory pollution control and assisting firms with environmental problem solving, the MoInd plays an important role in highlighting opportunities in Thailand's environmental sector. There are several MoInd agencies engaged in environmental services. The Department of Industrial Works (DIW) monitors effluents and emissions, regulates environmental policy, and reviews the required EIA prior to issuing licenses. The treatment of hazardous waste is primarily the responsibility of the Office of Industrial Environment Management. The Industrial Estate Authority of Thailand (IEAT) provides environmental services such as storage of hazardous and solid waste, and centralized wastewater treatment plants.

Bangkok Metropolitan Administration (BMA). The BMA is the premier local government in the country, responsible for the management of the capital city and its hinterlands. The Governor and the council are directly elected by the residents. It plays a significant role in the upkeep of the city's environment and provision of basic services. Its mandate includes provision of water supply; collection, treatment and disposal of wastewater and municipal solid waste; and planning and maintenance of city roads. The BMA collects property taxes and other revenue enhancing measures and receives central Government grants to finance its activities.

* *See also Annex B.*

3

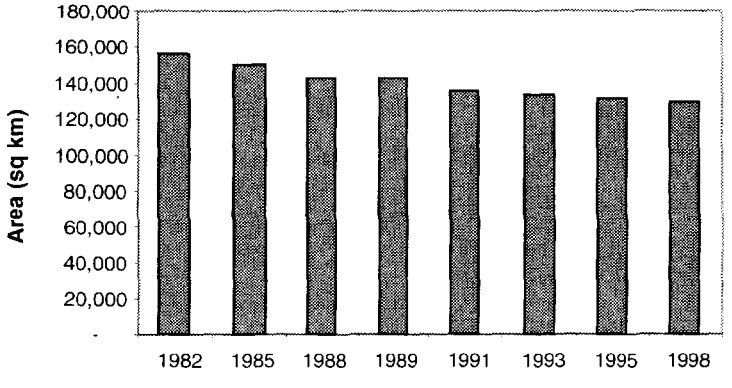
Overview of the Environment—Trends, Responses and Challenges

FORESTS AND WATERSHEDS

Trends

Deforestation. Forests covered about 53 percent of the total land area of Thailand in 1961 but dropped drastically to about 28 percent in 1989—at which time a nationwide logging ban on the country's terrestrial forest reserves was enacted (see Figure 3). By 1998 this decreased further to just over 25 percent.[24] The rate of decline has slowed from 0.9 percent per year before the ban to 0.4 percent per year just after the ban and was down to 0.2 percent per year between 1995 and 1998.[25] The bulk of the decline in forest cover was due to unsustainable practices of pre-ban logging concessions. Since the ban, illegal logging and encroachment by farmers have been the main contributors to loss and degradation of forests. The slowdown in forest cover loss

Figure 3. Forest Cover in Thailand (1982 - 1998)



24 Royal Forestry Department report on remote sensing interpretation, 1996.

25 "Environmental Statistics of Thailand 1998." National Statistic Office, Office of Prime Minister.

masks the continued decline in the quality of forest stands, which is more difficult to monitor.

Biodiversity. Thailand is richly endowed with flora and fauna species, which are spread across 15 terrestrial ecosystems and a large variety of freshwater and marine ecosystems. The country's biodiversity is high because it includes both the Indo-Malayan and Asian continental biogeographical regions, but endemism is low because of limited geographical isolation. However, significant loss of dryland forests, coastal mangrove forests and wetlands has resulted in a decline in biodiversity. Among plants, about 100 species are classified as endangered and another 900 are considered rare or vulnerable. Among animals, known extinctions include various species of shrimp, fish, reptiles, birds, and two mammals.[26]

Response

Forest management. To improve forest management practices, in 1992 the RTG classified forest reserves (totaling 147 million rai; up from 125 million rai in 1982) into three distinct zones: (i) conservation zone; (ii) economic zone (commercial or productive forests); and (iii) agricultural zone. Despite the downward trend in forest cover, the National Forest Policy has set a target for forest cover to increase by 15 percent, up to 40 percent of total land area.[27] Of this amount, 15 percent would be *conservation forest* and the remaining 25 percent *commercial or productive forests*. To reach this goal would require extensive reforestation, well beyond historical rates, and implies a significant increase in investment.

Biodiversity and protected areas. The protected area system covers 16 percent of the total land area of the country (50 million rai) and consists of 65 terrestrial parks, 44 wildlife sanctuaries, 54 non-hunting areas, 57 forest parks, 5 botanical gardens and 44 arboreta. The Government intends to increase coverage to 19 percent of total land area (59 million rai) through the addition of 50 terrestrial national parks, 15 wildlife sanctuaries and 3 non-hunting areas. While the existing protected area system is sufficiently representative of the country's various ecosystems, protected areas are not well managed and many are "paper parks" with significant populations in residence.

Watershed management. There are 25 river basins and lake systems in Thailand. A watershed classification system based on five geophysical variables was introduced starting in the late 1970s to help classify watersheds according to biophysical characteristics and specify intended land use (for example, forest protection, grazing, etc.). Based on this system, watershed classification maps (using 1 square kilometer grids) and land use regulations were completed and approved by the Cabinet for all regions in 1992.

Challenges

A broad range of issues requires additional attention to support *conservation of national parks and wildlife sanctuaries* including (i) more effective enforcement of the forest logging ban, through enhanced policing capabilities (surveillance, log monitoring and log trade control technologies), better prosecution and tougher penalties; (ii) more frequent monitoring of

26 "Environment Profile of Thailand," ADB, 1998.

27 A date was not specified as to when the 40 percent target would be achieved.

changes in forest cover using interpretation of satellite images and ground truthing; (iii) increased staff capacity through additional recruitment and focused technical training; (iv) formal demarcation of protected areas, wildlife sanctuaries and buffer zones, in consultation with local communities; (v) participatory development of management plans for protected areas, including buffer zone activities; (vi) involvement of local communities and nongovernmental organizations (NGOs) in implementation of management plans; and (vii) full financing of recurrent costs of management through increased user and service concession fees.

Enhanced watershed management would help protect the headwaters of important river basins as well as prevent large-scale soil erosion and downstream sedimentation. Key measures include (i) formal demarcation of Watershed Class 1A and 1B areas[28] and development of management plans for these areas in consultation with local communities; (ii) rehabilitation of steeply sloping denuded areas, including reforestation and other soil erosion control measures as appropriate; (iii) engagement of local communities and NGOs in protection of watershed areas; and (iv) research and extension support for new agricultural technologies to stabilize shifting cultivation and establish sustainable upland farming systems, including agro-forestry and community forestry.

28 Classes 1A and 1B represent the most ecologically sensitive watersheds.

WATER RESOURCES

Trends

Overuse of surface and groundwater sources. Thailand's past three decades of sustained and rapid economic development stimulated an expansion of demand for water services. During the 1980s alone, water demand more than doubled, from 20.5 billion cubic meters per year in 1980 to 43 billion cubic meters in 1990, and is forecast to double once again in the next ten years. The largest use of water is for irrigation (89.5 percent), followed by domestic needs (7 percent) and industrial needs (3.5 percent). In response to the increased demand, surface water supply has developed haphazardly, supplemented by a growing, unsustainable reliance on groundwater. The effects of the 1998–99 drought have exacerbated the situation. Supply has not kept pace with demand and this has resulted in the following:

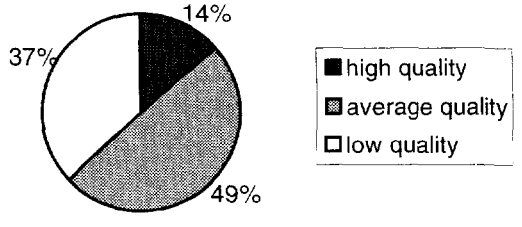
- Water reserves are currently at an all-time low in the county's two largest dams—Bhumibol on the Ping River and Sirikit on the Nan River. Reserves in the dams have fallen to under 3.6 billion cubic meters, less than half the normal levels of 8 to 10 billion cubic meters and well below the two dams' combined net storage capacity of 16 billion cubic meters.
- Only 35 percent of the irrigable area in the lower Chao Phraya, the country's main agricultural area, receives sufficient water during the dry season in a good year.
- In the BMR, groundwater pumping of 1.5 million cubic meters per day is currently nearly double the estimated sustainable yield of 800,000 cubic meters per day from the aqui-

fer, and the resulting land subsidence is a major economic and environmental issue.

- Similarly in some rural areas, increasing water scarcity has led to an unsustainable reliance on groundwater. In the drought year of 1994 for instance, an estimated 50,000 irrigation wells were sunk in the lower Chao Phraya Basin alone.

Deteriorating water quality. Despite effluent and water quality standards, surface water quality in Thailand's major rivers shows a deteriorating trend. In 1997, the Pollution Control Department (PCD) undertook a water quality survey of the country and found that 14 percent of surface water resources are in good condition (suitable for aquatic animals and general human consumption), 49 percent are in average condition (usable for agriculture and general consumption), and the remaining 37 percent are of low quality (see Figure 4). Pollution from domestic sewage is problematic throughout the country, with surface water resources in central Thailand the most degraded, containing high levels of coliform bacteria. Another increasing concern is the rise of ammonium nitrates in water, which endangers aquatic resources. Industrial pollution is most severe in the BMR due to industrial concentration, especially in the Chao Phraya and Lower Thachine Rivers. The lower reaches of the Chao Phraya River are always low in dissolved oxygen, averaging only 0.8 milligrams per liter, compared to 5 milligrams per liter considered suitable for consumption. Groundwater quality is also thought to be deteriorating but little monitoring has been conducted to evaluate this trend.

Figure 4. Quality of Surface Water in Thailand
Pollution Control Department Survey in 1997



Response

Government response to these trends can be broadly classified under two headings: (i) water resource management and (ii) wastewater investments. With regard to the former, the Government established the Office of the National Water Resources Committee (NWRC) in 1996 to coordinate water resource management activities. The NWRC oversaw the drafting of a new Water Law, which has not yet been submitted to the Cabinet for approval. The draft law explicitly calls for the establishment of river basin organizations to facilitate management of water within hydrological boundaries of major river basins; responsibility for national coordination remains with NWRC. In 1997, the Government completed a comprehensive Chao Phraya Basin Water Management Strategy, which supports the early establishment of the Chao Phraya River Basin Organization. This will serve as a model for other basins in the country. With respect to wastewater investments, the Government committed $550 million for wastewater collection and treatment systems in the BMA in 1998. Similar investments are also under consideration for secondary cities and towns.

Challenges

Issues related to *institutional responsibilities* and *user charge policies* represent the first set of challenges for water resource management. Responsibility for water management is divided among 30 agencies in six ministries; water quality responsibilities have similarly been assigned to several agencies. Inter-agency cooperation is weak and therefore clarifying institutional arrangements is a high priority for the Government. Cost-recovery policies for wastewater collection and treatment and user charge policies for water are also poorly designed and rarely implemented. This has resulted in unsustainable investments (that is, inability to cover operation and maintenance costs) and perverse incentives (such as use of water for irrigation). Review and rationalization of these policies is a high priority.

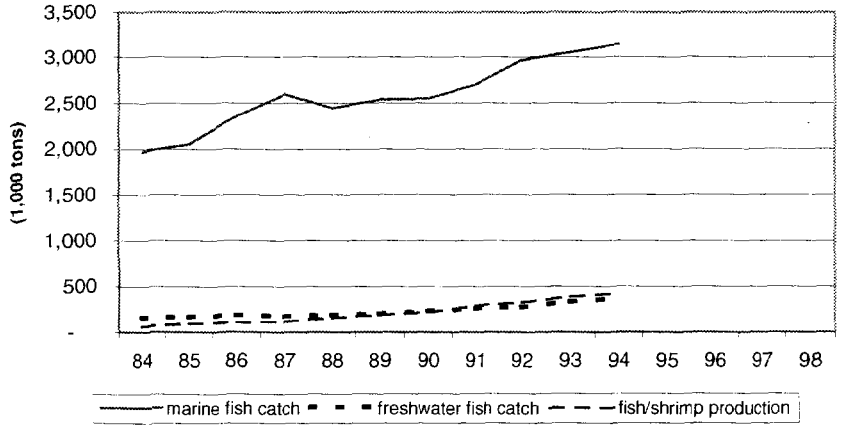
A second set of challenges revolves around *integrated water resource management*. In addition to institutional reform, key measures to ensure more effective use of scarce water resources include (i) finalizing and enacting the draft Water Law; (ii) formulating water resource management plans for major watersheds; and (iii) adopting mechanisms for reallocation of water from low-value to high-value uses.

COASTAL RESOURCES

Trends

Fisheries. Between 1981 and 1995, fisheries catch and production increased at a rate of 4.3 percent per year, from 2.0 million tons to 3.6 million. Fueling this growth has been a dramatic increase of 11.8 percent per year in coastal aquaculture and freshwater fish production. Analyzing fish production by sub-sector in 1995 reveals that 79 percent of production is derived from marine capture, 10 percent from coastal aquaculture, and 5 percent each from inland capture and freshwater culture (see Figure 5). However, in terms of the total value of fisheries production (estimated at 96 billion baht in 1995), the marine capture fishery contributed only 47 percent, to coastal aquaculture's 43 percent, and the inland capture and freshwater aquacul-

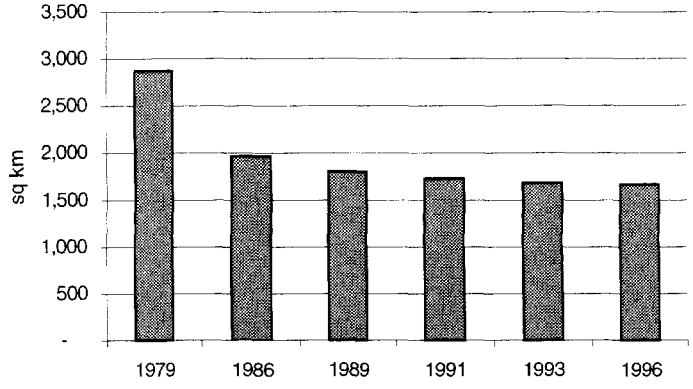
Figure 5. Annual Catch and Production of Fish (1984-1998)



ture subsectors each contributed about 5 percent.

Mangroves. Thailand lost more than half its mangrove forest area between 1961 (372,000 hectares) and 1993 (168,000 hectares). From a high of approximately 13,000 hectares per year of mangrove forest lost nationwide between 1979 and 1986, the rate of decline decreased to 2,600 hectares per year from 1991 to 1993. The loss rate slowed further in the mid–1990s, with mangrove area declining only 1,000 hectares, to 167,000 hectares in 1996.[29] Analysis of end land use using remote sensing data indicated that a large part (66 percent) of this decline was due to the combined effect of clear-felling for timber, firewood and charcoal; and clearing for agriculture, salt evaporation ponds, road and port development, and mining.[30] The single largest end use (32 percent) was shrimp farm development, although it could not be determined from the remote sensing images whether shrimp ponds were developed directly from virgin mangrove or from former mangrove areas that had already been cleared for other purposes. See Figure 6.

Figure 6. Mangrove Forest Area (1979-1996)



Response

Fisheries and aquaculture management. The focus of the Department of Fisheries has traditionally been on development and only recently have DOF programs emphasized management and conservation. The rapid development of aquaculture was led by the private sector, principally small farmers, with little intervention or oversight by the DOF.

Marine biodiversity and protected areas. The Royal Forestry Department (RFD) is charged with management of Marine Protected Areas (MPAs). There were 18 marine national parks in Thailand covering 3 million rai as of 1998. Currently about 60 percent of the county's coral reef areas and other important marine habitats such as seagrass beds, marine turtle nesting sites, and mangrove forests are located within MPAs. Household and industrial wastes and sedimentation have had negative impacts on important coastal and marine habitats, such as seagrasses and coral reefs.

Challenges

Coastal resources need to be more effectively managed to reduce economic and social conflicts. Key measures include (i) strengthening the policy and regulatory framework to support integrated planning and coordinated management of coastal resources; (ii) minimizing adverse impacts of major coastal activities through land use

29 Forest Statistics of Thailand, 1996.

30 Conclusion reached by Joint Working Committee of RFD, DOF, DLD and NRC.

planning and zoning of areas appropriate for aquaculture and tourism; (iii) banning further conversion of mangrove areas and replanting converted areas as appropriate; and (iv) refocusing research and extension on sustainable aquaculture practices including development of disease-resistant stocks.

Improved management of *capture fisheries* is needed to control overharvesting and the resulting decrease in catch-per-unit-effort and loss of resource rents. Key measures include (i) updating maximum sustainable yield and maximum economic yield estimates for major fishing areas and species; (ii) establishing a co-management framework for cooperative management by Government, private sector and fishing communities; (iii) reducing the level of fishing effort in line with maximum economic yield through systematic retiring of boats and gear; and (iv) restricting new entries and capturing a higher portion of resource rents, through significantly increased license fees and other charges.

LAND

Trends

Land titling and tenure. Thailand's total land area is about 51 million hectares. Of this approximately 38 to 39 million hectares are officially designated as public land and 12 to 13 million hectares are designated as private land. Despite the official designations, over half the land area of the country is occupied by permanent residents. On public lands, only about half the estimated number of occupants have occupation certificates. Challenges in land titling emerge in part from the inability to title land classified as "forest areas." Permanent residents reside in many "forest areas," however the classification of these areas has not changed and therefore people are less willing to invest in land they do not own. A related issue is the inability to legally title land within 1 kilometer of "forest areas" unless the boundary has been demarcated by the RFD and the Land Development Department (LDD). The process of boundary demarcation should be expedited to allow land titling to proceed at a more rapid pace. In addition to issues of security, land titling is important because it facilitates access to credit, which is a priority for Thai farmers. Inability to access credit contributes to inadequate investment in land improvement and poor land management.

Degraded lands and salinization. It is estimated that soil erosion affects between 17 and 21 million hectares in Thailand, resulting in on-farm and off-farm impacts. Further loss of soil nutrients through leaching is estimated at over 27 million tons per year. Salinization is a problem in the northeast as well as in the south along the coast. In the arid northeast, the problem is caused by irrigation with saline water. The LDD estimates that 105 million rai are prone to severe salinization and another 16 million rai to medium or low salinization. In the south salinization results from expansion of brackish water aquaculture areas (estimated at 16,000 hectares) inland from the coast.

Response

There are numerous Government agencies engaged in *land allocation and titling*, but the four principal agencies are (i) Department of Lands (Ministry of the Interior), which is the only agency that can issue the full title of deed under the 1954 Land Code; (ii) Department of Public Welfare, which issues Nor Sor 3 Kor (NS3K) tenancy certificates in resettlement areas that can be

converted after a period of time into certificates of utilization and ultimately titles of deed; (iii) Agricultural Land Reform Office, which issues Sor Por Kor (SPK) tenancy certificates to squatters on public lands for a maximum of 50 rai per person; and (iv) RFD, which issues Sor Tor Kor (STK) tenancy certificates for 1 rai to squatters encroaching on natural forest reserve areas, and the right to lease up to 50 rai from RFD. The intent of RFD's STK program was to reduce forest encroachment, by establishing permanent settlements in areas designated by RFD as appropriate for agriculture. However, the program has not been able to keep pace with the demand for land in upland areas, and problems with encroachment in forest reserves continue.

Soil conservation is the responsibility of the LDD (MoAC), which undertakes surveys to analyze land suitability for development, and on this basis implements a land classification system. The LDD also formulates land use plans, but these are not binding. Currently, there is no systematic program in Thailand to address land degradation, although LDD has undertaken some limited pilot projects with donor assistance.

Challenges

Enhanced management is needed to reduce land degradation and resource depletion. Important steps to improve land management include (i) continuation and completion of ongoing programs of land titling and land tenancy certification on both private and public lands; and (ii) reclassification of "forest areas" to reflect land use patterns more accurately, and formal demarcation of forest boundaries—both of which would facilitate land titling initiatives. A broader set of challenges includes strengthening the policy and regulatory framework to support integrated land use planning and zoning; refocusing research and extension on sustainable agriculture practices and piloting these approaches; and establishing a co-management framework for participatory land use planning and management by Government and local communities.

AIR QUALITY

Trends

Transport sector—air pollution. Vehicular air pollution is most severe in Bangkok, and the analysis here is limited to the city. The ten–year old air monitoring network in Bangkok consists of 17 stations and monitors TSP, PM_{10}, CO, Pb (lead), SO_2, NO_x, O_3 (ozone), HC (hydrocarbons), meteorological parameters, and other specific pollutants as needed. Trends from monitoring data indicate:

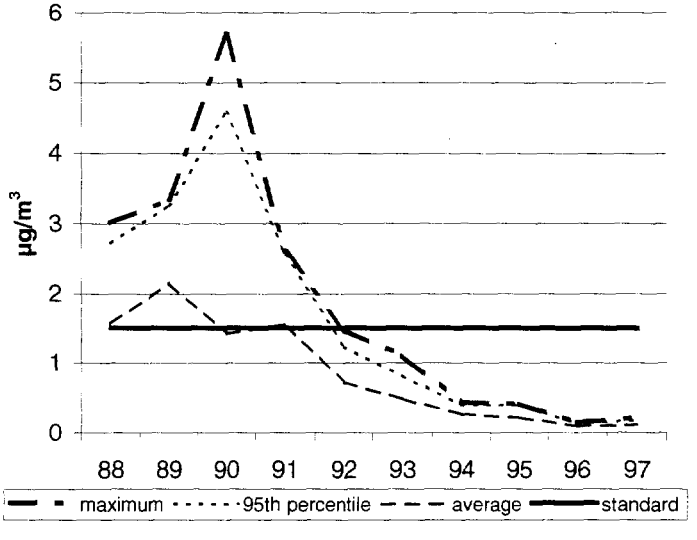
- *Particulate matter:* The annual mean TSP curbside level of 480 micrograms per cubic meter (average from 1988–1997) exceeds the annual average standard of 330 micrograms per cubic meter. For 1997 the TSP in non-traffic dominated sites was 120 micrograms per cubic meter. While the frequency of exceeding the daily TSP standards is over 70 percent at the curbside locations, it is only 2 percent at the non-traffic-dominated sites. The sources of TSP are reported to be 40 percent from diesel, 40 percent road dust and 20 percent from industry and others. The 1994 World Bank study on the urban environment estimates that a 20 percent reduction in the concentration of TSP would generate annual health

benefits between $400 million and $1.6 billion.[31]

- *PM_{10}:* Average PM_{10} levels at curbside sites reflect an upward trend since 1992 and have always exceeded the standard. The daily standard for PM_{10} (120 micrograms per cubic meter) is exceeded 21 percent of the time at the curbside monitors and 13 percent of the time at non-traffic-dominated sites.
- *Carbon monoxide (CO):* The one– and eight–hour average concentrations of curbside ambient CO occasionally exceed the standards (<1 percent). Even though the vehicle population has increased exponentially, CO levels have declined over the last decade. This is due to fleet modernization, enforcement of emissions standards, less traffic congestion due to more roads and highways, and improvements in fuel quality (oxygenate requirements).
- *Lead:* Ambient lead levels have dropped precipitously since the introduction of unleaded gasoline in 1992 (see Figure 7). Current average curbside concentrations are reported to be 0.12 micrograms per cubic meter (factor of 10 less than the 1991 level of 1.5 micrograms per cubic meter). The 1994 World Bank study also estimated that a 20 percent reduction in lead concentrations would result in health benefits between $300 million and $1.5 billion. These benefits have been more than realized in the steep decline in lead concentrations since 1990.[32]

Energy sector—air pollution. Over the past fifteen years, energy demand (especially for electric power) has constantly increased in response to economic development and today it is five times the 1986 consumption of 4,180 megawatts. However, power generation is not currently considered among the major contributors to air pollution, and is localized in areas where power plants are found. In Mae Moh, 13 power plants with an installed capacity of 2,626 megawatts are responsible for excessive levels of sulfur dioxide. Following a serious incident caused by its power plants in 1992, the Electricity Generating Authority of Thailand (EGAT) introduced a comprehensive policy for environmental protection and accorded full departmental status to its environmental unit. The environmental

Figure 7. Lead Pollution in Bangkok (1988-1997)



31 "Thailand: Mitigating Pollution and Congestion Impacts in a High-Growth Economy," World Bank, 1994.

32 Ibid.

compliance of EGAT's power generating plants has significantly improved.

Response

The Government has taken a strong and targeted approach to addressing *air pollution in Bangkok*—perhaps more so than for any other environmental problem. Specific initiatives include:

- Improvements in fuel quality (unleaded, oxygenates and gasoline reformulation, reduction of sulfur and reformulation of diesel, low smoke lube oil).
- Construction of new roads, implementation of mass transit system projects, traffic management and reductions in vehicle kilometers traveled (bus lane, system reform, reversible lane, parking restrictions, enforcement of traffic laws, flexible working hours, catalytic converters required for cars).
- Improvements in emissions standards for new and in-use motor vehicles.
- Improvement of vehicle inspection and maintenance system and road side inspections.
- Fuel switching for private cars and tuk-tuks.
- Control of dust on the roads and from construction.

In 1992 the RTG approved legislation establishing the *Energy Conservation Promotion Act*, which increased the level of commitment and resources available to implement a comprehensive national energy efficiency program. The Act (i) formalized the responsibilities of the Department of Energy Development and Promotion (DEDP) as the lead Government agency for energy conservation; (ii) gave DEDP the authority to issue voluntary building energy codes and appliance efficiency standards; (iii) identified a class of large energy users as "controlled facilities" and required that they hire energy managers, conduct energy studies and develop energy conservation plans; and (iv) established the Energy Conservation Promotion Fund (ECF), financed largely through taxes on refinery products, to support such activities.

In addition the Cabinet gave the EGAT the legal mandate and authority to pursue Demand–Side Management (DSM) programs, targeting appliances in six categories that significantly contribute to Thailand's electricity demand growth—lighting measures, air conditioners, refrigerators, freezers, ballasts and motors. In December 1992, the Demand–Side Management Office (DSMO) was created within EGAT to take the lead in the design, implementation and evaluation of DSM programs. The DSM Sub-Committee was established to oversee the progress of DSM implementation.

According to its engineering estimates, the DSMO has exceeded its original load reduction and energy savings targets, achieving about 383 megawatts of peak load reduction and 1,868 megawatts in annual energy savings as of March 31, 1998, which also meant a significant reduction in CO_2 emissions. Efforts are underway to verify these estimates with end-use metering, customer and manufacturer surveys, distributor sales data and billing information. The DSMO has completed one program (high-efficiency fluorescent tube lamps), is implementing thirteen programs (refrigerators, air conditioners, green buildings, industrial cost reduction, industrial energy service company [ESCO] development, motors, compact fluorescent lamps, street lighting, thermal storage, standby gen-

eration, interruptible load, time-of-use tariffs and awareness raising) and is preparing three programs (ballasts, new buildings and green leaf). In addition, building codes have been enacted, regulating the energy consumption of commercial facilities (1995) and industrial facilities (1997). An important measure of the success of the DSM Program is EGAT's explicit inclusion of DSM in its integrated energy resource planning for the 8th National Economic and Social Development Plan (NESDP). The Plan includes supply-side investments as well as a load reduction target of 1,400 megawatts by 2001 as a direct result of DSM measures.

Challenges

The ability of Bangkok to attract investments is determined in part by its livability and transport efficiency; addressing air pollution issues therefore would enhance the city's competitiveness. Four main tasks requiring attention emerge: (i) an integrated strategy linking urban transport, mass transit, and air quality should be developed; (ii) a coordinated approach to air pollution control led by BMA and involving other agencies and private sector partners needs to be initiated; (iii) the technical capacity of BMA and other agencies needs to be substantially strengthened; and (iv) steps to reduce the rise in photochemical, nitrogen oxides, and HC pollution need to be supported.

Despite the Government's commitment to energy conservation and efficiency, the ECF has disbursed little to date. The application process is lengthy and bureaucratic and DEDP lacks sufficient staff and expertise to evaluate the preliminary and investment grade audits submitted so far. No privately owned facility has yet received project financing from the ECF, although a number of Government buildings have received investment support from DEDP. MoSTE is planning to allocate a significant portion of the ECF to be used as a credit line to develop an ESCO market in Thailand for both industrial and commercial building. Yet, given the unfamiliarity of commercial banks with ESCO and the perceived risks associated with such investments, commercial financial institutions have been unwilling to provide financing, despite the high returns in many cases. There exists a limited understanding of ESCO services among building owners as well as a lack of familiarity for project risk allocation. There is also a general lack of awareness of the cost savings potential from energy efficiency investments among building owners / managers. The perceived creditworthiness of these potential customers, particularly given the requirements for 5–7 year performance contracts, has also hindered ESCO activities. These latter barriers have only been exacerbated by the recent economic recession.

Solid and Hazardous Wastes

Trends

Bangkok accounted for a quarter of the 13 million tons of household solid waste generated in the country in 1996; collection efficiency increased from 80 percent to over 95 percent in the same period. However, in secondary towns and cities the level is well below 80 percent. The daily generation rate has doubled to 8,500 tons since 1989. Also, 1.5 million tons of industrial hazardous waste and 4,000 tons of healthcare waste were generated in 1995 in Bangkok. Indications are that there is an in-

crease in the rate of generation for all categories of waste.

Response

The BMA and municipalities are placing more importance on garbage collection, as seen from the improvements in collection infrastructure and efficiency. However, environmentally safe disposal remains a major problem. Bangkok has two engineered landfills that process about half the waste generated, but other cities have none. Phuket City constructed an incinerator but discontinued its use due to excessive operation and maintenance costs. Recently however agreement was reached for the central Government to finance the operating costs of the incinerator. There are two privately operated hazardous waste treatment facilities, but neither can process solvent-containing wastes. The RTG is also encouraging industry to introduce pollution prevention techniques to reduce the generation of hazardous waste. Healthcare waste in Bangkok is incinerated.

Challenges

A comprehensive national plan is required to address solid and hazardous waste management. This should promote (i) waste minimization and separation; (ii) improvements in solid waste collection levels, recycling, recovery, composting, and final disposal in sanitary landfills; (iii) a decrease in use and generation of hazardous substances in manufacturing industries, and their safe and environmentally sound disposal; (iv) construction of additional treatment and disposal facilities; (v) introduction of Polluter Pays Principle and incentive mechanisms; and (vi) strengthening local government capacity (for example in conducting risk assessments) to stimulate private participation in this sector.

TRANSBOUNDARY ISSUES

Thailand is a signatory country of many international conventions designed to address transboundary issues including ozone depletion, global warming, biodiversity, transportation of hazardous waste, pollution from land-based activities, and oil spills. Thailand's commitments and obligations to these conventions, however, vary significantly depending on the development objectives and implementation mechanisms of the conventions and the institutional capacity within the country. Regarding ozone depleting substances (ODS), Thailand ratified the Vienna Convention (1985) and the Montreal Protocol (MP) (1987) in July 1989, the London Amendment (1989) in June 1992, and the Copenhagen Amendment (1992) in December 1995. The DIW of the MoInd is the key implementing agency and significant progress has been made to reduce ODS usage. The country has also ratified the Framework Convention on Climate Change (FCCC) and its subsequent protocol (Kyoto Protocol) and the Basel Convention, but has not ratified the Biodiversity Convention or MARPOL. The Office of Environmental Policy and Planning (OEPP) of MoSTE is the focal point for the FCCC, Kyoto Protocol, and Biodiversity Convention. The PCD of MoSTE is the focal point for Basel while DIW is the implementing agency. The Harbor Department of the Ministry of Transport and Communication (MoTC) is the focal point and implementing agency for MARPOL.

Trends

Ozone Depleting Substances (ODS). ODS are used mainly in the manufacturing and service sectors as refrigerants, cleaning solvents, aerosols, fire extinguishers and blowing agents for various foam products. Thailand is not an ODS producer; most of the substances are imported, and consumption per capita is less than 0.3 kilograms/year; Thailand is therefore considered an Article 5 country. Based on the import data, ODS consumption increased from 2,812 metric tons ODP[33] (or 14,330 metric tons) in 1986 to 8,893 metric tons ODP (or 15,648 metric tons) in 1991. Of the 1991 amount, 37 percent were used in solvent cleaning, 26 percent in air conditioning, 17 percent in foam blowing, 11 percent in refrigeration, 6 percent in fire extinguishing, and 3 percent in aerosols. Since 1994, the country program has been actively implemented and a significant amount of ODS was phased out. According to the import data, ODS imports were steadily reduced from 9,537 metric tons ODP (or 17,744 metric tons) in 1992 to 4,514 metric tons ODP (or 5,186 metric tons) in 1997. This amount will be reduced further in line with the targets established by the MP.

Global warming. CO_2, CH_4, and N_2O are the major greenhouse gases (GHG) causing climate change and their generation will largely increase proportionate to the country's economic development and population. CO_2 is the most important GHG and is generated primarily from combustion of fossil fuels and deforestation. CO_2 accounts for about 73 percent of the total generation of greenhouse gases. CH_4 is the second most important (25 percent) and is mainly generated from decomposition of organic matter under oxygen deficient conditions (such as waterlogged paddy fields, landfill, wastewater treatment plants, and wetland). N_2O is generated from fertilizer (organic, nitrogen-based), industrial processes, biomass burning and other sources.

Other conventions. Information related to biodiversity, hazardous waste transport, land-based sources of pollution, and oil spills is relatively limited and scattered compared to that for ODS and GHG.

Response

ODS. In line with MP obligations, a country program on ODS phaseout was prepared and approved by the MP in 1993. The program calls for (i) zero import of Halon 1211 in 1994 and Halon 1301 in 1995, and phasing out of Halon in the service sector by end 1998; (ii) zero import of CFCs (11, 12) and phasing out of CFCs (113, 114, 115), CCl4, and TCA by end 1998; and (iii) phasing out of CFCs (11, 12) in the service sector. To achieve these objectives, the Government has initiated a number of investment programs through UNDP, UNIDO, and the World Bank, and funding was provided to enterprises for the incremental costs. During the early stage of the program, efforts were placed on phasing out ODS usage in the manufacturing sector (mainly air conditioning and refrigeration). In addition, the institutional capacity of key agencies and exchange of information have been supported through UNDP and UNEP programs. The Government also issued a regulation to control import of ODS through a quota system. After nearly seven years of implementation of the ODS phaseout project, ODS consumption in

33 Ozone Depleting Potential, which normalizes to a common unit all ODS with varying damage potential.

the manufacturing sector has been almost completely eliminated.

Global warming. Since the FCCC was established long after the MP, specific targets and agreements on the phaseout mechanism have not been reached. In 1997, the Kyoto Protocol established clear targets for Article 1 (developed) countries during 2008–2012 relative to 1990 levels. Despite the lack of obligation on GHG reduction, the RTG has implemented a program to reduce CO_2 discharge from the energy sector through a DSM program. Several studies were also undertaken to establish the 1990 baseline data and develop a country strategy for GHG.[34] Funding assistance from the Global Environment Facility (GEF) has been requested. The Government has also established an energy conservation fund aimed especially at big buildings.

Other conventions. The RTG attempted to ratify the Biodiversity Convention but objections from NGOs and academia have led to significant delay. A national policy and action plan for 1998–2002 to conserve biodiversity (genetic, species, ecosystem) was established and approved by the Cabinet in 1997. However, implementation of these activities is unclear. As for the Basel Convention, DIW has established a control system through the Toxic Substance Act, although monitoring, reporting and coordination among key agencies appear to be lacking.

Challenges

ODS. Despite active implementation of the ODS project, experience indicates that meeting the targets will not be easy and 3–5 years delay may be inevitable. There are four key challenges. First ODS are safe substances, cheap, and nontoxic to humans so finding a replacement has not been easy—technological development, cost-effectiveness and safety of alternatives are often the problem. The second challenge is the management difficulty and cost-effectiveness of the investment program. Most large enterprises (manufacturing sector) have already phased out ODS while small and medium enterprises (SMEs) that have very limited technical knowledge and financial capacity to comply with the country program remain a priority. The third challenge is dealing with the service sector. Public understanding and the cooperation of vehicle owners and consumers of the other related products are limited. Effective public information and dissemination programs will need to be undertaken, but unfortunately these activities are not eligible for MP funding. The fourth challenge is adequate institutional capacity and cooperation of key agencies.

Global warming. There are at least three important issues related to global warming. First, knowledge to estimate sources and sinks, especially those from land use changes, is limited. Second, the 1990 data suggest that deforestation and land use changes are the major source of GHG; reduction efforts may therefore have significant impacts on the agricultural sector. And third, the institutional capacity of key agencies is limited, with GHG reduction responsibilities assigned to several agencies.

Other conventions. The major issue with respect to biodiversity is how and when the country will be ready to ratify the Convention. It is expected that the promulgation process of a national law

34 These studies include the National Communication of Thailand, National Action Plan on Climate Change of Thailand, Asia Least-Cost Greenhouse Gas Abatement Strategy.

will take about one to two years. Emergency plans for oil spills, effective control of land-based sources of pollution and transportation of hazardous wastes also remain unaddressed.

4

Setting Priorities

FRAMEWORK

Priorities for World Bank assistance have been identified through extensive consultations with the Government and other partners and a review of relevant analytical work from previous World Bank and non–World Bank studies. A five–step approach has been adopted to set priorities. The first step assesses the key environmental and natural resource trends. Causes are analyzed and needed reforms identified in the second step. The third step defines the objectives and scope of RTG–World Bank collaboration, which serves as the basis for analyzing and identifying priorities for World Bank assistance in the fourth step. The final step lays out the proposed World Bank assistance strategy.

Step 1: Assessing the Trends

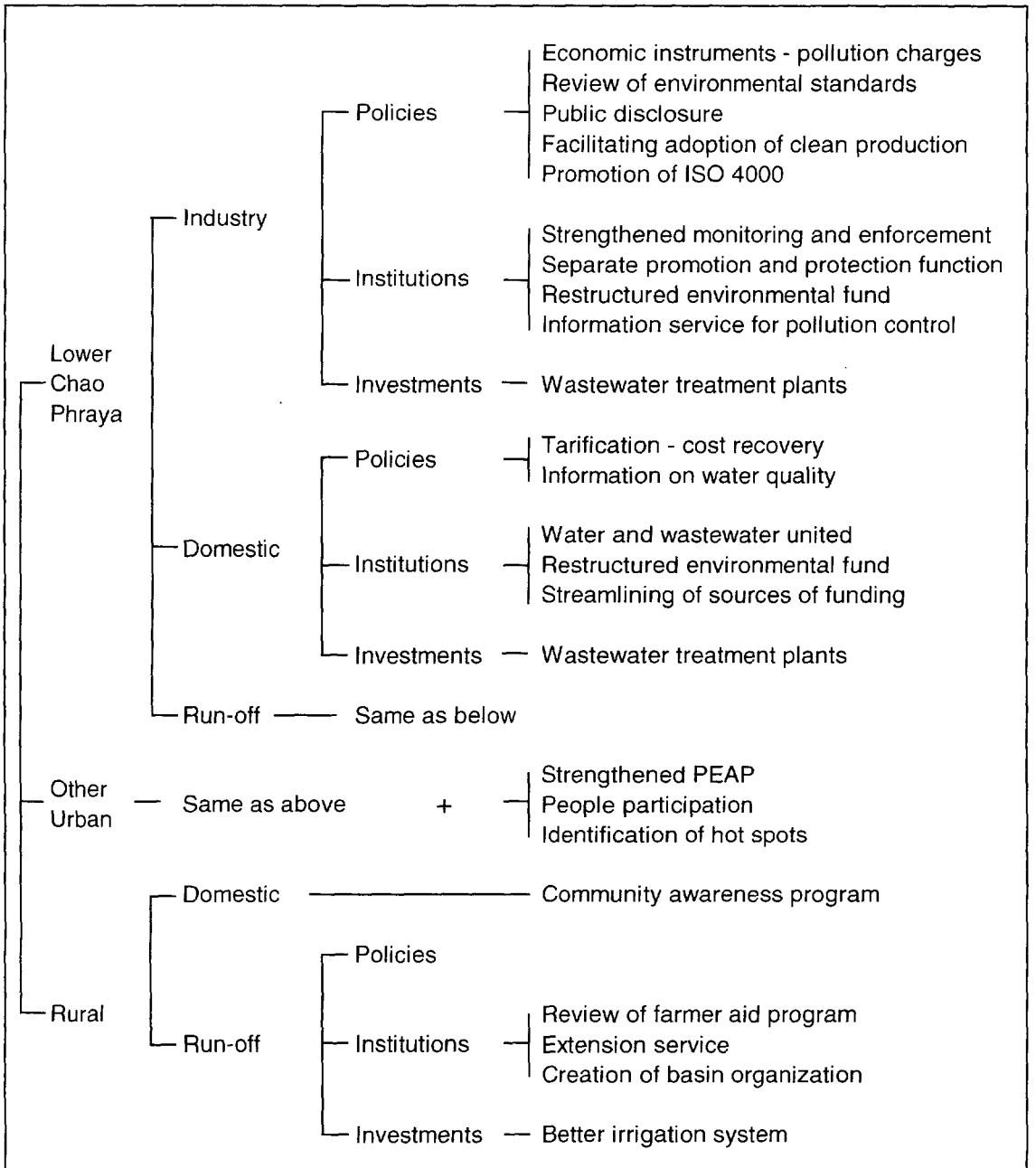
A review of the current environmental trends and responses presented in the earlier section reveals the problems. Identified below in Table 2 are the environmental resources and attributes that have a higher order of visible and perceived degradation in the country.

Table 2. Priority Environmental Trends

Key Trends	Severity	Location
Declining water quality in Chao Phraya	High	Chao Phraya River Basin
Increasing water scarcity	High	Country-wide
Declining air quality	High	Bangkok and near power plants
Loss of critical habitats	High	Protected areas
Watershed degradation	Medium	
Rising generation of solid and hazardous wastes	Medium	Bangkok, secondary towns and industrial zones
Declining marine and freshwater resources	Medium	
Land degradation	Medium	
Declining forest cover	Low	

Step 2: Analyzing the Causes and Identifying the Changes

The preceding section sketched the broad challenges that Thailand faces in protecting and restoring its environmental resources. The series of reform charts that follows outlines the causes underlying these challenges and the corresponding policy and institutional corrections and investment needs.



Reform Chart 1: Water Quality Degradation

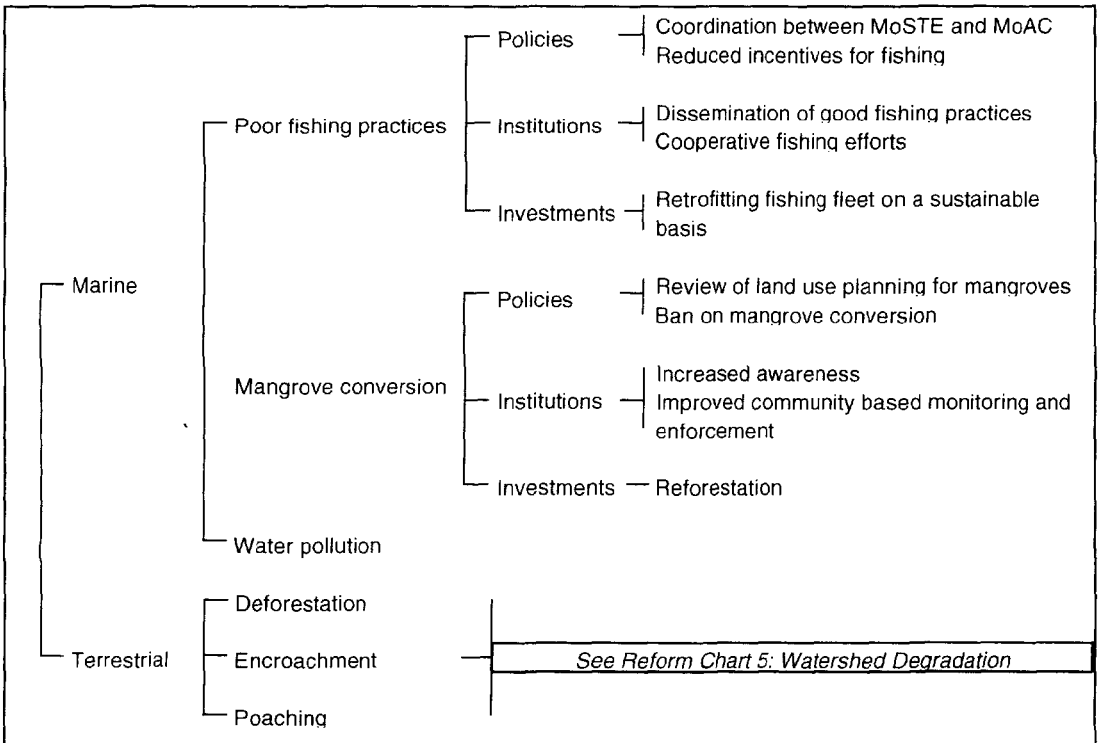
- Rural
  - Irrigation
    - Policies
      - Establishment of water allocation instruments
      - Pricing of water including tradable water rights
      - Registration of water rights
      - Policies for groundwater use implemented
    - Institutions
      - Establishment of river basin authorities
      - Agricultural extension services
      - Strengthened monitoring and enforcement functions and inter-agency cooperation
    - Investments
      - Better irrigation system
  - Domestic
    - Policies
      - Economic instruments
      - Identification of hotspots
    - Institutions
      - none
    - Investments
      - none
  - Drought
    - none
  - Industrial
    - none
- BMR
  - Industrial
    - Policies
      - Review/reduction of reliance on groundwater
    - Institutions
      - Strengthened monitoring and enforcement functions and inter-agency cooperation
    - Investments
      - New water supplies
  - Domestic
    - *See Reform Chart 1: Water Quality Degradation*
- Other Urban
  - None

See Reform Chart 1: Water Quality Degradation

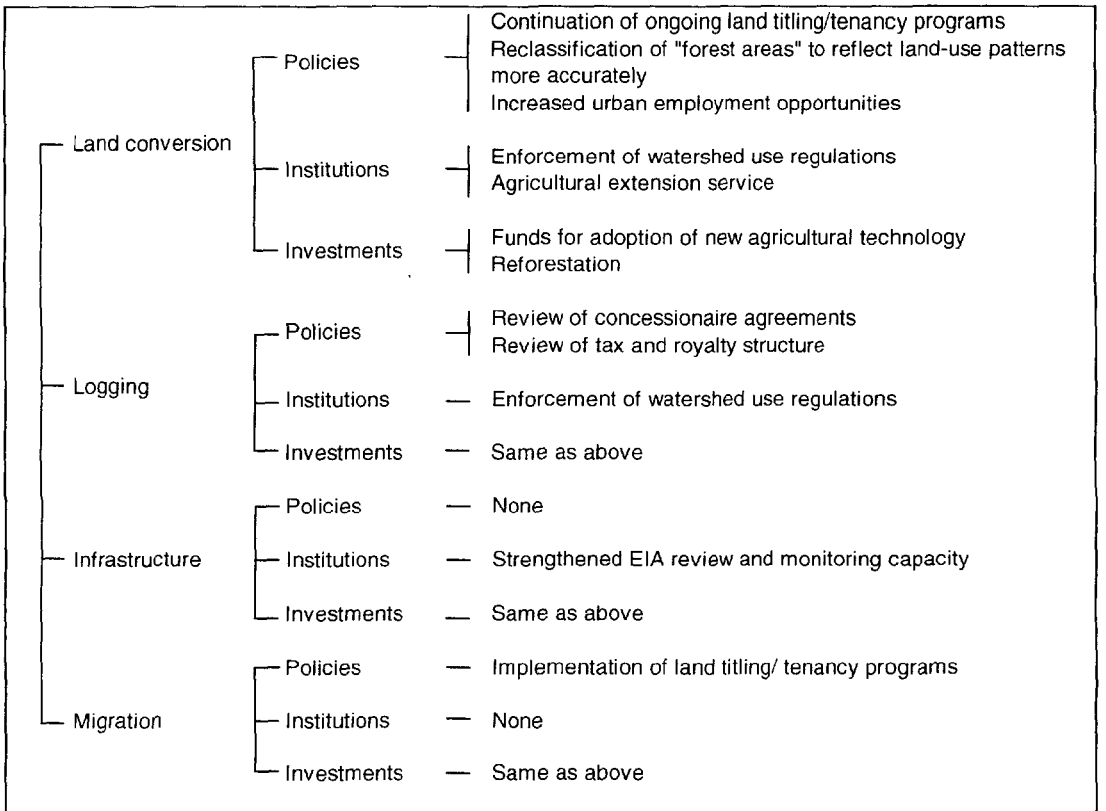
Reform Chart 2: Water Scarcity

- Bangkok
  - Transport
    - Policies
      - Integration of different modes of transport
      - Progressive reduction of subsidies
      - Restricted addition of new 2-stroke engines and phase out of existing ones
    - Institutions
      - Incentives to upgrade transport fleet
      - Improved coordination between BMA, LDD, and PCD
      - Strengthened enforcement measures of LTD and Traffic Police
    - Investments
      - Road construction
      - Improved mass transit
  - Industry
    - Policies
      - Support for cleaner production technology
      - Economic instruments
    - Institutions
      - Enforcement shifted from DIW to MoSTE
      - Community-based monitoring
    - Investments
      - Private sector investment
  - Power
    - Policies
      - Development of ESCO market
    - Institutions
      - Streamlined ECF application process
- Secondary Cities
  - Transport
    - Subset of above
  - Industry
    - Subset of above

Reform Chart 3: Air Quality



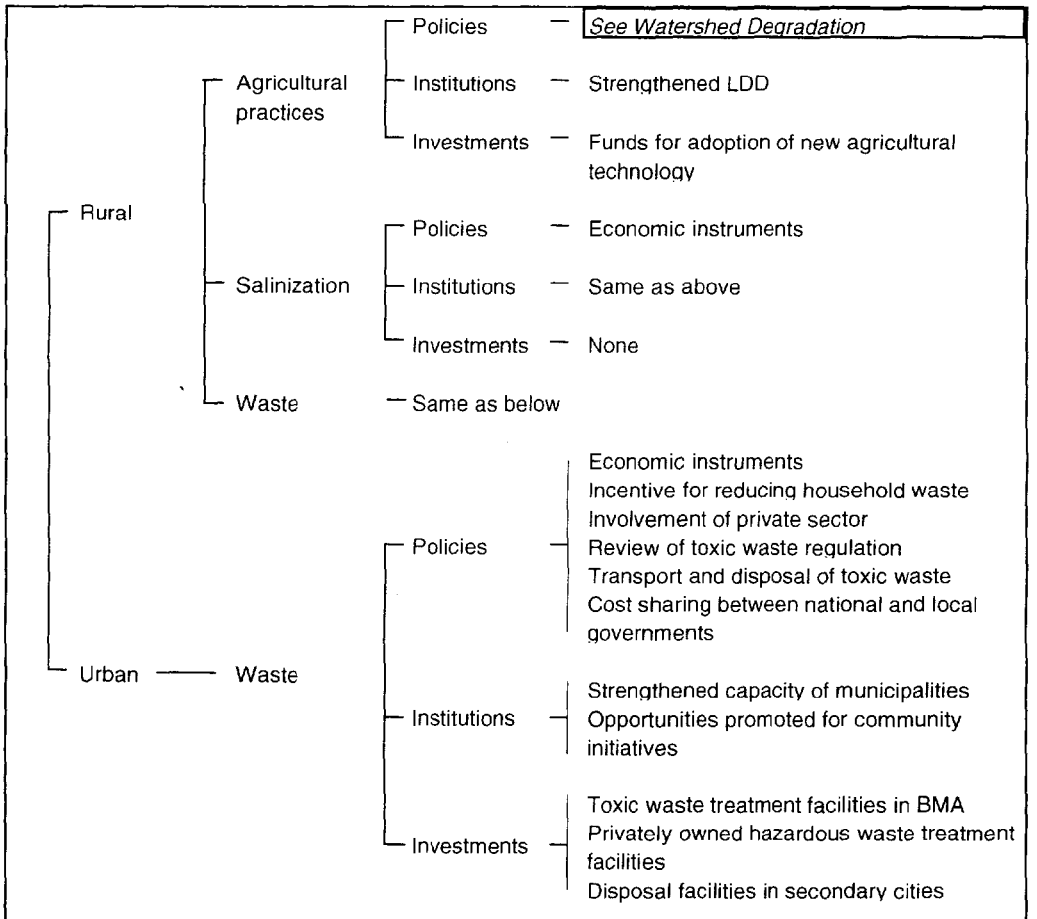
Reform Chart 4: Loss of Critical Habitat



Reform Chart 5: Watershed Degradation

- Mangroves
  - High demand for fuel wood
    - Policies
      - Review of zoning/ land use plans for mangroves
      - Ban on further conversion of mangroves
    - Institutions
      - Improved awareness
      - Improved community-based monitoring and enforcement
      - Refocus on research and extension of sustainable aquaculture practices
    - Investments
      - Reforestation
  - Agricultural conversion
    - Same as above
  - Shrimp farm development
    - Same as above
- Fisheries - marine and freshwater
  - Excessive fishing fleet
    - Policies
      - Updated MSY/MEY for fishing areas/ species
      - Restricted entry of new effort through increased fees/ charges
    - Institutions
      - Coordination between DoF, MoSTE, MoAC
    - Investments
  - Destructive fishing practices
    - Policies
      - Incentives/ bans on fishing practices
    - Institutions
      - Dissemination of best practice
    - Investments
      - Retrofitting fishing fleet
  - Mangrove conversion
    - Same as above
  - Effluents and agricultural run-off
    - Policies
      - Review use of pesticides/ Review number of MPAs
    - Institutions
      - Coordination between DoF, MoAC, DIW
      - Agricultural extension services
      - Community-based monitoring
    - Investments
      - None

Reform Chart 6: Declining Marine and Freshwater Resources



Reform Chart 7: Land Degradation

Step 3: Defining the Scope of RTG–World Bank Collaboration

The next step is to define the scope and objectives of RTG-stakeholder-World Bank partnership for addressing the different challenges outlined above. The 8th National Economic and Social Development Plan (1997–2001), the 20–Year Environment Plan, and the World Bank's CAS provide the context for defining the scope for collaboration. The overarching objectives are: *to ensure that natural resources and the environment remain a priority during the recovery period* and *to help set the foundation for a more holistic and proactive approach to conservation and environmental protection.* On the first objective, the ongoing economic crisis and recovery will continue to require attention and resources from several priority areas simultaneously. With regard to the second objective, the crisis presents Thailand with an opportunity to re-examine the relationship between growth and the environment and embark on a development path that avoids past mistakes. A central element of this collaboration is the need to partner with other donors to achieve these two objectives.

Step 4: Targeting World Bank Assistance

Three criteria are used to provide direction for framing the World Bank strategy and applying assistance appropriately:

- *Consistency with policy objectives and opportunities for reform*—an assessment of environmental policy objectives and actions specified by the RTG in the 8th Plan and 20–Year Environment Plan, and of existing institutional commitment and capacity to carry out necessary reforms and investments to achieve these objectives.
- *On the ground impact (high cost of inaction)*—a review of the key economic sectors and regions where specific policy changes and investment projects are required to result in tangible environmental improvements. To the extent possible, priorities are based on analytical work that estimates social benefits from alternative policy and project interventions.[35] Specifically, a formal analysis of the social costs and benefits of intervention should be undertaken where required. However, at this stage only very rough estimates and conclusions can be made. The principle of cost-effectiveness should also be considered when designing specific interventions in a sector or geographical area.
- *Comparative advantage*—an assessment of the areas of comparative advantage for the World Bank, taking into account its limited presence and the ongoing activity of bilateral donors and NGOs in the environment sector. Annex D contains a description of past and ongoing World Bank involvement in this sector.

Step 5: Framing the Strategy for World Bank Assistance

The final step in this priority setting exercise is to outline the World Bank strategy. The proposed environmental strategy consists of two mutually complementary tracks, with Track 1 focusing on functional improvements, and Track 2 on priority investments. An overview is presented below and the strategic themes of each track are detailed in the next section:

- *Functional improvements* through policy and institutional reforms.
  - ◊ Strengthening environmental governance through (i) restructuring and reengineering environmental agencies to improve functional efficiency; (ii) strengthening the enforcement and compliance mechanism; (iii) supporting decentralization by making the PEAP process more effective; and (iv) building technical, managerial, and analytical capacity.
  - ◊ Improving the sustainability of environmental financing by (i) transforming the EF into a revolving mechanism; (ii) supporting the creation of MBIs for improved pollution management; and (iii) introducing cost-recovery measures for environmental services.
  - ◊ Enhancing opportunities for community involvement by (i) supporting communities in

35 The priority setting conclusions are based in part on *Thailand: Mitigating Pollution and Congestion in a High-Growth Economy*, World Bank, 1994.

improving their local environment; (ii) promoting environmental awareness through information dissemination; and (iii) improving disclosure of environmental information to the general public.

- *Priority investments.*
  - ◊ Improving the environmental quality of the BMR by (i) targeting investments; (ii) reforming policy; and (iii) building capacity of BMA to control air and water pollution.
  - ◊ Supporting improved water management in the Chao Phraya Basin through (i) enhancing the legal and regulatory framework for water management; (ii) establishing a dedicated river basin organization to plan and implement sound policies and investments; (iii) reforming and building capacity for management in key water agencies; and (iv) undertaking priority investments in irrigation infrastructure and remedial works on dams at risk of failure.
- *International obligations.* The strategy also recognizes the importance for Thailand to respond adequately to various international obligations (such as the MP and Basel Convention). The World Bank will continue to offer its assistance through MP and GEF initiatives.

ANALYSIS FOR SELECTING PRIORITIES FOR WORLD BANK ASSISTANCE

Criteria	Trigger	Outcome
Consistency with policy objectives and opportunities for reform	Crisis has led to popular discontent and demands for greater transparency and public participation in decisions. Credibility of the Government's ability to enforce environmental laws is very low. Demands are articulated in new Constitution, 8th NESDB, 20–Year Environment Plan, and PEAP. Fiscal austerity measures place even greater emphasis on cost-effective public interventions. Provincial and local capacity is limited.	Institutional fragmentation requires priority attention. Enforcement and compliance need to be significantly improved. Focus should be on capacity building for provincial and local governments. Cost-effectiveness of public investments should be assessed. Policy reforms should be reviewed.
On-the-ground impact (high cost of inaction)	Chao Phraya Basin and Bangkok contain majority of the country's population, economic (and industrial) activity, and consequently environmental problems. Mortality and morbidity rates from air and water pollution are highest in Chao Phraya Basin and Bangkok. Poor water use exacerbated by drought in 1998 reveals importance of improved water management. Agriculture and manufacturing are the dominant economic sectors contributing 40 percent to GDP. 1994 World Bank study indicates that highest priority problems for the urban environment are air pollution due to TSP and lead, surface water pollution due to microbiological contamination, and traffic congestion in the BMR.[36]	Priority should be given to public investments in the Chao Phraya Basin and Bangkok. Air and water issues are a priority in terms of cost-benefit tradeoffs.
Comparative Advantage	Previous environmental involvement in Thailand limited to energy and rural sectors—with a mixed record. Ability to bring global experiences and cross-sectoral coordination. Access to large financing for capital investments. Donors actively involved in capacity building initiatives and NGOs have taken lead in grass-roots community initiatives. 1998 CAS highlights three themes: enhancing competitiveness, reforming institutions, and enhancing quality of life as central to World Bank involvement.	Lead taken in policy and institutional dialogue with RTG leveraging size, global experience, and cross-sectoral involvement. Consideration should be given to large investment projects. Work collaboratively with donors and NGOs especially in capacity-building and community initiatives.

36 A similar analysis for natural resources has not been conducted recently.

5

Proposed Strategy—The Five Strategic Themes

The five strategic themes are presented in the following structure: (i) setting out the broad parameters; (ii) diagnosing the key issues; (iii) reviewing the ongoing work; (iv) detailing the thematic strategy; and (v) outlining the role for the World Bank.

TRACK I: FUNCTIONAL IMPROVEMENTS

Strategic Theme 1: Environmental Governance

Diagnosis

For several years, weak public administrative performance has been recognized as a key obstacle to Thailand's economic development objectives. Public institutions are highly segmented with limited cooperation between agencies and ministries. Five ministries—MoSTE, MoInd, MoAC, MoInt and MoTC—and a host of agencies under them have an immediate role related to the environment or natural resources. Given the current state of governance, there is a broad consensus in Thailand to review the institutional arrangements for addressing environmental and natural resource issues. Since environment is a crosscutting theme (in that it is affected by most Government policies and projects), it is a challenging endeavor to design an appropriate structure. Every country develops its own model to suit its social, cultural and political context. Examples include Ministries of Environment and Natural Resources or Forests (Philippines, India, Sri Lanka), Environment as a subject in a larger ministry (Malaysia, Thailand, Pakistan, Vietnam), National Environment Commissions or equivalent (Chile, Colombia) and Environmental Regulatory Agencies (China, USA, Japan and Europe). The emerging view in Thailand today is to create a new Ministry of Natural Resources and Environment that would combine the natural resource functions of MoAC, environmental functions of MoSTE, and enforcement functions of MoInd.

The 1992 NEQA and 1997 Amendments to the Constitution clearly specified that environmental and natural resource functions would be decentralized to provincial and local

governments. There is also a growing demand from communities to be more actively involved in protecting the environment. A number of shortcomings have however been identified: there is limited public involvement in preparation of the PEAPs; the provinces do not require local governments (municipalities and tambons) to prepare local level plans; and Provincial Governors, as central Government appointees, are not necessarily identified with the local administration. A Government-appointed committee is working on revising the 1992 NEQA to reflect recent amendments to the Constitution and rectify some of the above shortcomings. There are several other pieces of legislation that have an impact on environmental protection and conservation. Some of these laws pre-date the NEQA and may be less relevant to the challenges faced today.[37] A systematic review of environmental legislation may prove useful.

Other donors. Support for improving environmental governance comes from several development assistance partners. Many grants are often less than $1 million and directed at capacity building in national agencies. The Asian Development Bank (ADB) provides considerable technical assistance for institutional development, the most important of which is the restructuring program of MoAC. Other ADB initiatives include building capacity in the water sector, strengthening planning capability through enhancements to the EIA process, and formulating a national sustainable development strategy. ADB has also provided a loan to enhance cleaner production in the manufacturing sector. DANCED and CIDA are supporting capacity building and training programs in the PCD and Department of Environmental Quality and Promotion (DEQP) respectively. GTZ works with DIW to design and implement MBIs, and with the Department of Local Administration (DOLA) to improve urban environmental planning in selected municipalities.

37 Environmental legislation (Canal Maintenance Act) from as early as 1903 is still in effect in Thailand today.

Strategy

Institutional restructuring, decentralization and compliance are core elements of the proposed strategy and also of the broader dialogue between the World Bank and the Government:

- *Institutional restructuring.* Within the current institutional setting, there are specific opportunities to improve the functional efficiency of individual agencies in MoSTE, MoAC and MoInt through an exercise of restructuring, reengineering, and capacity building. The purpose of this exercise would be to harmonize functions across agencies, clarify enforcement responsibilities, strengthen monitoring and public disclosure, promote customer orientation in service delivery (such as procedures for EIA), promulgate required legal changes, and enhance staff skills. A key element of this initiative would be to clearly separate regulatory functions from those of promotion and development. The efforts of the World Bank are expected to eventually pave the way towards consolidation and mainstreaming of environmental and natural resources management functions across ministries and levels of government.
- *Decentralization.* The World Bank would support a strengthened and

participatory PEAP process that fulfills objectives set out in Article 290 of the Constitution. Decentralization is relatively new to Thailand and the approach should be gradual, taking into account existing weaknesses. The challenge to revitalize environmental governance will require vision and leadership, political commitment, ability to compromise, and resources.

- *Compliance.* Enforcement mechanisms are undergoing major changes worldwide (see Box 4). Governments are supplementing command-and-control measures with MBIs and public disclosure tools (see also Strategic Themes 2 and 3). The strategy will assist the RTG to modernize its enforcement and compliance mechanisms by initiating regulatory reforms.

Proposed World Bank Involvement

The World Bank would provide assistance through two instruments: (i) Proposed Public Sector Reform Loan (PSRL); and (ii) Proposed Environmental Institutions Development (EIDP) Project, a Learning and Innovation Loan. The RTG Cabinet of Ministers recently announced an ambitious public sector reform program. The PSRL would support implementation of the program over the next three years. The PSRL has two objectives: the first focuses on public finance and the second on public administration. The purpose of the latter is to support selected ministries in their organizational development and restructuring programs in part through reengineering of functions and processes. The program would be financed through annual loan tranches and is expected to pro-

Box 4. The Three Waves in Enforcement and Compliance

It is possible to identify three distinct waves of instruments used by environmental regulators to create incentives for pollution control. The first wave generally took the form of specific standards imposed on polluters (effluent and emission standards in effect putting a ceiling on the amount of pollution that a polluter may discharge). This approach—usually referred as the command-and-control approach—suffers from a number of important shortcomings. Among these, it has been shown that the approach is not cost efficient, does not provide polluters with continuous incentives for pollution control, and requires strong and comprehensive monitoring and enforcement capacity. This capacity has generally been lacking.

A second wave, still underway, has seen the increasing use of economic instruments such as pollution charges, emission charges, and tradable permits (including tradable water rights and tradable fishing licenses for example). While economic instruments also require a strong monitoring and enforcement capacity, they have a great advantage to promote cost efficiency, and provide polluters with incentives to continuously invest in pollution control (to the extent that the cost of the investment may be recovered by a reduction in total pollution charges). In a large number of instances, economic instruments have not replaced but been used in combination with effluent and/or emission standards. It has been shown that regulators have generally been reluctant to introduce pollution charges at levels that may truly create incentives for pollution control.

A third wave, identified as the information regulation wave, has recently been launched. An increasing number of environmental regulators around the world (from countries such as Canada, France, and the United States to countries such as Indonesia, Mexico and the Philippines) have recognized that local communities, consumer markets, and capital markets are in numerous instances in a position to put pressure on polluters and induce them to reduce their emissions. In order to empower these agents, information and public disclosure of the environmental performance must be made available. Recent analysis has shown that public disclosure programs have induced large reductions in pollution emissions.

Source: Shakeb Afsah, Benoit Laplante, and David Wheeler, Controlling Industrial Pollution: A New Paradigm. Development Research Group, The World Bank. Available on: www.worldbank.org/nipr.

vide budgetary support to facilitate institutional reforms. The RTG has selected MoSTE, MoAC and MoInd among the six pilot ministries for priority assistance from PSRL. This operation would support the institutional restructuring and reengineering objectives of MoSTE, MoAC, and DIW. Preparation for the September 2000 tranche would require MoSTE to undertake the following tasks related to reengineering of OEPP, PCD and DEQP; (i) functional review; (ii) budget and expenditure review; (iii) conceptualization of proposed changes; (iv) broad consultations; and (v) preparation of a time-bound reform plan. Similar exercises would need to be done by MoAC and DIW. This task in MoSTE would be guided and managed by a senior level Experts Committee appointed by the NEB, and supported by a Task Force Secretariat at MoSTE. The committee would be chaired by a distinguished professional and include senior staff from MoSTE (OEPP, PCD, DEQP), MoAC, MoInt, DIW, Office of the Civil Service Commission (OCSC), Bureau of Budget (BoB), other agencies and independent professional advisors and consultants. Preparatory efforts would be funded through the Asia Europe Meeting (ASEM) and other trust funds.

The EIDP would supplement PSRL by providing quick response assistance to MoSTE to support immediate capacity building needs emerging from the reengineering exercise. This would be prepared between June 1999 and February 2000. The operation would be a multi-donor effort led by the World Bank. Components may include (i) priority human resources development needs for restructuring efforts; (ii) pilot decentralization models in selected provinces and strengthening of the PEAP process; (iii) regulatory reforms to improve compliance through the introduction of public disclosure tools; and (iv) reform of the EF. The World Bank would also provide assistance through a series of non-lending advisory services—in the form of seminars and training programs to share international knowledge and experience on institutional models, compliance and decentralization.

Strategic Theme 2: Environmental Financing

Diagnosis

The main thrust of the environmental protection strategy in Thailand has been in the form of regulatory environmental standards. Incentives for compliance with standards take the form of penalties. It is generally recognized that this command-and-control approach has failed to create incentives for pollution control since monitoring and enforcement are limited. The Government through the NEQA has recently called for implementation of the Polluter Pays Principle, and particularly for implementation of MBIs. Many of these instruments (product taxes, user charges, input taxes, royalties, pollution charges, etc.) are currently under consideration by various public agencies in Thailand. Given the poor level of coordination across agencies, various MBIs may be introduced in isolation to one another thereby potentially reducing their effectiveness. Moreover, earmarking revenues generated by the MBIs may lead to a multiplicity of "environmental funds," each administered independently from the other, thus increasing transaction costs and reducing the overall effectiveness of the resources made available. The design of clear and transparent rules and guidelines regarding the appropriate use of revenues generated by the MBIs must go hand in hand with the

design and implementation of the mechanism itself. ADB is supporting a study conducted by OEPP and HIID on MBIs.

Currently in Thailand, cost-recovery of public investments in wastewater treatment plants and solid waste management has been seriously lacking. It is generally recognized that not even operation and maintenance costs are covered by tariff structures. As a result, a significant proportion of these investments fails to deliver the expected environmental benefits (such as increased water quality and improved public health), and needed investments in these sectors are seriously hampered. The inability of local governments to raise revenues from the provision of public services also prevents the existing EF from functioning as a revolving fund, as was originally intended. ADB is currently supporting a study aimed at strengthening cost-recovery policies for the wastewater management sector. The problem is further compounded by the separation of water supply and wastewater into two distinct functions with different institutions responsible for them. This denies opportunities for cross-subsidization as practiced elsewhere in the world.

The Environment Fund (EF) was established in 1992 under the NEQA. Its overall purpose is to provide loans and grants to Government agencies and local administrations to support air pollution, wastewater and solid waste projects. OECF has made significant financial contributions to the EF. While NEQA does not prevent the EF from providing loans to private individuals and firms, few such individuals have requested the support of the EF to undertake pollution abatement projects—in large measure because of poor enforcement. It is generally admitted that the EF has achieved limited success in becoming an effective funding mechanism to support the provision of local environmental services. In particular the EF has failed to operate as a truly revolving fund, as mentioned above. As a result, it is running out of resources.

Strategy

Pollution charges, cost-recovery and a revolving EF need to be integrated into the development and implementation of a sustainable financing mechanism for environmental improvements. This would be the main thrust of the strategy.

- *Market-Based Instruments.* Among MBIs, pollution charges need to be regarded as an important component of the environmental strategy. An amendment to the Factory Act is under preparation by DIW to allow the MoInd to introduce pollution charges. GTZ is currently supporting DIW in designing a pollution charge scheme, and DIW expects to be in a position to implement the scheme in early 2001. The challenge is to design a simple and transparent scheme with a clear and credible implementation program, which targets a small number of polluters and pollutants at first.
- *Cost-recovery.* To promote reliable and sustainable provision of municipal services, the RTG needs to (i) improve incentives for cost-recovery through restructuring the tariff charges that currently fail to reflect costs and actual use; (ii) treat water supply and wastewater as a single sector and merge the two functions and agencies; (iii) support provincial and local government in acquiring financial management skills; (iv) coordinate

the several funding sources currently available for public investment (such as BoB, EF, MoInt); and (v) enhance participation of the private sector.

- *Restructuring the Environment Fund (EF).* To reform the EF into an effective revolving fund, the RTG should address issues such as the multiplicity of uncoordinated sources of funding for public environmental initiatives and poor cost-recovery practices at the local level. The lack of experienced staff trained in financial management also needs to be addressed. A revitalized and properly functioning EF also would serve as a trigger for improvement of other environmental financing mechanisms in Thailand. The overall financing mechanisms for environmental services at the municipal level should be re-examined.

Proposed World Bank Involvement

The World Bank is considering a variety of lending and non-lending instruments to support environmental finance objectives and to complement the efforts of ADB and GTZ. These will be discussed and further developed in the near future but may include the following:

- *Pollution charges.* The EIDP Loan would provide support for design of an effective pollution charge scheme. The effectiveness of the scheme depends on its simplicity, clarity and transparency, and on the participation of all stakeholders. Also critical are the ability and capacity of the implementing agency to monitor the environmental performance of polluters and enforce compliance.
- *Cost-recovery.* Lending and non-lending services may be provided for training purposes on matters of financing of local environmental services and cost-recovery. The acceptance and endorsement of a cost-recovery strategy is an important component in investments relating to urban environmental management.
- *Environment Fund.* Recapitalization of the EF would be considered within the context of the PSRL, and an allocation may be possible under the condition that it be allowed to function properly as a revolving Fund.

Strategic Theme 3: Community Involvement

Diagnosis

Historically in Thailand (as is the case in most countries around the world), there has been limited involvement of local communities in publicly financed environmental protection activities. In the aftermath of the crisis, the RTG has signaled its interest in supporting initiatives for community-based approaches in order to promote income-generating activities and protect the environment. This shift reinforces Article 290 of the new Constitution, which advocates stronger public participation in environmental and natural resources management. However, there is strong criticism, especially from NGOs, that decision making on major development initiatives is not transparent and does not fully solicit public inputs and opinions. Moreover, local initiatives to improve the environment (such as solid waste collection) are constrained by limited access to finance and lack of technical and management skills. These shortcomings have helped bring about

an environmental ethic that argues for broader and deeper participation of local communities.

Strategy

The World Bank attaches great importance to community empowerment initiatives and recognizes that the success of a more holistic and proactive approach to the environment hinges on active community participation. Community involvement is essential to improve environmental conditions because most problems are local in nature—such as solid waste management, wastewater treatment and disposal, watershed management and growing water scarcity. But the World Bank also recognizes that NGOs and bilateral donors possess a comparative advantage in working with local communities given their in-field presence and ability to provide grant money directly to communities. Consequently the World Bank would like to support ongoing initiatives where possible, but it has identified two specific areas for a more direct role: (i) to facilitate access to financing for pilot environmental projects and skill enhancement; and (ii) to promote community participation in large industrial projects through information dissemination and involvement in environmental monitoring.

Proposed World Bank Involvement

The World Bank currently has two instruments to promote the first element of its strategy. First, it has secured a grant from ASEM to finance a technical assistance (TA) project on empowering urban communities. This TA would finance (i) a rapid assessment of environmental issues in four secondary urban centers; (ii) small-scale pilot activities to support community environmental services; and (iii) community workshops to share skills and lessons learned. A steering committee chaired by the PCD is overseeing implementation of the project. Second, the World Bank and Government have recently established a Social Investment Fund which is designed to facilitate financing for community-based initiatives (including local environmental projects). The World Bank proposes to assist communities in accessing grants from the Social Investment Fund. The specific components of this assistance are to be determined in the upcoming months.

The second element of this strategic theme would be supported through the EIDP Loan. The objective would be to enhance information disclosure on the impacts of industrial plants (planned and existing) and to involve local communities in environmental monitoring of these plants. In developing this element, experience from Indonesia (PROPER) and the Philippines (ECOWATCH) is likely to prove useful.

TRACK II: PRIORITY INVESTMENTS

Strategic Theme 4: Air Quality and Waste Management in Bangkok

Diagnosis

Bangkok contributes nearly half of the country's GDP and accounts for over a third of its manufacturing enterprises and motor vehicle population. This has led to major environmental problems. Air and water pollution remain serious. It is reported that environmental quality has temporarily improved because of reduced economic activity. As indicated earlier, ambient levels of lead,

SO_x, NO_x and carbon monoxide have declined significantly. However, other pollutants—namely PM_{10}, TSP, ozone, and HC—continue to exceed standards. The lower reaches of the Chao Phraya and Thachine rivers have very low levels of dissolved oxygen indicating low biological activity. While transport emissions cause air pollution, untreated municipal and industrial waste contribute to worsening water pollution. Added to this are the over-extraction of groundwater and twice the level of recharge, which have exacerbated subsidence and flooding. From the foregoing, it is obvious that development and growth of the country have not been guided by sound environmental principles. Nevertheless, since the early 1990s the RTG has been investing in corrective actions, in response to growing public demand. Among these are the phasing-out of leaded gasoline since 1992, decongesting some traffic arteries, and committing nearly $500 million for sewerage schemes. However, the response has been more "fire fighting" and less holistic planning. Institutional capacity for planning, monitoring, and enforcement remains weak and fragmented despite the fact that the BMA is an independent agency.

Support for environmental improvement in Bangkok has come from both internal sources and external assistance provided by many donors and export credit institutions. The former has been mainly through grants provided by the national Government, investments made by the private sector and through revenue streams of BMA. ADB, DANCED, GTZ and USAID have been providing technical assistance to BMA and PCD for capacity building in environmental planning and air and water quality monitoring, as well as preparing feasibility studies. The World Bank assisted in developing a strategy for particulate matter abatement (ADB, World Bank and OECF have financed investment projects in wastewater treatment, lead phaseout, and flood control respectively). For the future, ADB has signaled its intent to work outside of BMA and OECF has expressed cofinancing interests. DANCED will continue to provide technical assistance. Although BMA is hopeful of attracting private sector investments in wastewater treatment and solid waste management, this is unlikely given the present crisis, lack of a proper regulatory framework, and compartmentalization of water supply and wastewater. However, in the manufacturing sector, private enterprises will continue to invest in reducing industrial pollution and attaining ISO 14000 status.

Strategy

Recognizing that the problems are severe, solutions complex, and needs enormous, the proposed strategy is based on the following principles: (i) build on the lessons learned from previous work of the World Bank and other donors and explore opportunities for collaboration; (ii) support BMA and PCD in introducing more holistic approaches to planning, enforcement, and monitoring; (iii) select investments that have spatial significance and contribute to immediate health gain; (iv) phase World Bank support over a longer period of time through a mix of investment loans and non-lending advisory services that target further reduction in transport-related air pollution and improvements in wastewater treatment and disposal; and (v) support the gradual introduction of the Polluter Pays Principle and eventual application of user charges for cost-recovery of operations and maintenance of waste management facilities.

Proposed World Bank Involvement

In support of the above, the World Bank's Bangkok Urban Environment Program would have two lending operations and several non-lending advisory services for selected themes. The lending operations are the Bangkok Air Quality Management Project and the Bangkok Waste Management Project. Non-lending advisory services would be undertaken with other donors and participation of the World Bank Institute (formerly EDI). A seminar on private sector participation in water supply and wastewater management has already been completed. The proposed *Bangkok Air Quality Management Project* (FY01, $60–80 million) would finance emission reduction from transport sources, road dust control, capacity building of BMA, strengthened air quality monitoring network, and increased public awareness. The proposed *Bangkok Waste Management Project* (FY02, $350–400 million) would finance the planning and construction of a viable wastewater scheme for either Klong Toey or Thonburi, capacity building of BMA in waste management, and improvements to solid waste management, especially disposal.

Strategic Theme 5: Water Management of the Chao Phraya River Basin

Diagnosis

Section 3 traced the current problems of water availability and quality to poor management of water resources and the lack of an integrated spatial and ecological approach to better manage river basins. Key watersheds are under pressure from post-ban illegal logging and encroachment by farmers in upland areas. In fact, loss of forest cover and inappropriate land use practices have affected the hydrology of Thailand. This has resulted in topsoil erosion and sedimentation of waterways and storage structures. It is also thought to contribute to increased wet season runoff and consequent downstream flooding and reduced dry season stream flows. Because of its size, strategic location and economic importance, the Chao Phraya River Basin is a key watershed in the country. The basin covers almost one third of the country and accounts for two thirds of both employment and GDP. The economic and social costs of water competition and inefficient allocation are greater here than elsewhere in Thailand as about 3 million hectares in the basin are used for agriculture; competition from industrial and domestic uses is on the rise. While the effects of deforestation and illegal logging impact the upper reaches, the lower reaches suffer the consequences of urban and industrial pollution as the river winds its way through the BMR. The problem is further compounded by institutional fragmentation across agencies and levels of government.

The most active donors in the water sector are OECF, JICA, European Union (EU) and ADB. OECF, JICA, and EU assistance has mainly focused on the irrigation sub-sector, including systems rehabilitation, farm-level water management and water-user participation. The Japanese have also assisted with flood management in selected sub-basins. In the past, ADB assistance has concentrated on water supply and sanitation. However ADB has recently proposed an Agriculture Sector Program Loan, a $300 million adjustment operation which focuses on comprehensive reform of the water sector as one of its policy reform areas. Institutional and policy reforms sought include among others, passage and promulgation of the draft Water Law and a Cabinet decision to implement a

policy for cost-recovery in public irrigation schemes.

Strategy

The proposed strategy recognizes that the challenge to protect and properly manage the Chao Phraya Basin is immense. It requires a long-term commitment and a cross-sectoral approach to deal with the diversity of issues. In line with the World Bank's water policy, the proposed strategy would focus on the following key policy and institutional reforms:

- Develop institutional mechanisms at different levels—ranging from water-user associations at the local level to "basin organizations" at the basin level—in which civil society participates with Government in decision making, to balance the competing demands of different users, give greater attention to environmental sustainability, and ensure that policies outside of the water sector (such as land use policy) consider the implications for water management.
- Divest Government of its functions as a service provider, and develop its capacities to play the vital and demanding role of creating a legal and regulatory framework and institutions that are central to effective water management.
- Develop instruments (including licensing, tradable rights and service provision charges) that can induce the voluntary cooperation of users in ensuring that water can be moved voluntarily from low-value to high-value uses and used efficiently, and that services can be operated and maintained without large Government subsidies.

Proposed World Bank Involvement

To date the World Bank has not financed any water management projects in Thailand, although it has funded a significant amount of analytical work, including the development of a Chao Phraya Basin Water Management Strategy. The CAS includes one operation on natural resources, *Natural Resource Management Project* (FY01, $200 million), which is in the early stages of identification. The proposed project is intended to assist with key aspects of the long-term process of water resource management reform in Thailand, focusing on the Chao Phraya River Basin. It would take a basin-wide approach, and would focus on issues of watershed protection and dam safety in the upper basin, as well as issues of modernized irrigation management (and associated infrastructure investments), improved groundwater management, and better allocation and conflict resolution mechanisms basin-wide. A fundamental focus would be on the development and implementation of a new institutional structure—a Chao Phraya Basin Organization (CPBO)—in a manner consistent with the draft Water Law. The CPBO would be responsible for overall management of water in the basin, including drought and flood forecasting and planning; supply and demand management of surface and groundwater; and development of appropriate technical, administrative and economic measures for improved water allocation.

6

Proposed Government–World Bank Program

COLLABORATION IN ENVIRONMENT AND NATURAL RESOURCES

The following operations and non-lending activities have been identified in close collaboration with the Government and other development partners and in consultation with a broad range of key stakeholders including other donors. The operations include a combination of World Bank lending instruments,[38] non-lending advisory services, and grants through MP and GEF to meet global environmental objectives. Some of the operations will be cofinanced with other donors and OECF has formally committed its participation for the proposed operations in Bangkok. The non-lending advisory services listed below are expected to improve skills, knowledge and expertise. It should be stressed that the summary of operations and advisory services presented below in Table 3 is an optimistic scenario and would require the completion of several important steps—some of which may be politically difficult.

38 SAL, SECAL, sector investment loans, investment projects, and implementation assistance (in the form of capacity development loans)

FRAMEWORK FOR BENCHMARKING PROGRESS

A framework for monitoring progress based on the pressures-state-response model is being developed. The result will be a set of simple, easy to understand monitoring indicators. The National Statistics Office published environmental statistics in 1995 and 1998 that provide a body of data for use in preparing the framework. Once agreement on the framework is reached, an annual *Thailand Environment Monitor* would be published.

Table 3: Proposed Government–World Bank Collaboration in Environment and Natural Resources

Activity	Counterpart Agency/ *Other Donors*	Objectives	Description	Amount (US$)/ Timeline
1-2. Environmental Governance and Financing				
a. Proposed Public Sector Reform Program Loan	MoF, BoB and CSC and 5 line ministries including MoSTE / MoAC *GTZ, DANCED and ADB*	To support RTG's efforts to improve functioning of public sector agencies by revamping public finance and renewing public administration functions	Large structural adjustment loan intended to provide budgetary support of $1.6 billion between FY00 and 02 to RTG. Major activities: • *Public Finance*: Reforms in expenditure management, tax administration, and fiscal decentralization • *Public Administration*: Enhancing quality and efficiency of service delivery by introducing performance-based human resource management systems, and organizational renewal in selected line ministries including MoSTE and MoAC MoSTE will receive 3–year budgetary support of approximately $50–75 million to finance regular capital and recurrent expenditure	50–75 million for MoSTE Loan effectiveness: September 2000
b. Environmental Institutions Development Project	MoSTE/MoAC *GTZ, DANCED and ADB*	To provide assistance to MoSTE to support reengineering of environmental functions	Proposed multi-donor effort, led by the World Bank. Possible components include: • *Human Resources Development*: Building human resources capability across institutions and levels of government to support restructuring efforts of PSRL • *Regulatory Reform*: Efforts to strengthen enforcement and compliance mechanisms • *Decentralization*_Strengthening PEAP process and pilot provincial models	5 million Loan effectiveness: March 2000
Non-lending Activities c. Advisory services to key agencies, private sector and civil society	OEPP, PCD, DIW and DOLA *CIDA, GTZ, DANCED, ADB, IUCN, WWF and Foundations*	To facilitate transfer of international experiences and best practices to Thai environment community	• Seminars and workshops on alternative institutional models and decentralization • Advisory assistance for implementation of MBIs • Assistance to develop public disclosure techniques • Preparation of annual Thailand Environment Monitor • Workshops on public-private partnership	0.5 million To be conducted during 1999, 2000 and 2001
3. Community Participation and Involvement				
a. Social Investment Project	5 ministries *GSB, NESDB OECF*	To enhance social safety nets and provide funds for income generating activities in rural and urban communities	Though originally not designed for environmental improvement activities, has sufficient flexibility to enable urban and rural communities to invest in environmental improvement	Ongoing

Activity	Counterpart Agency/ *Other Donors*	Objectives	Description	Amount (US$)/ Timeline
Non-lending				
b. MEIP Pilot project to empower communities to improve environment and reduce poverty	PCD and NESDB *ASEM, GTZ*	To pilot community-based environmental initiatives in 4 secondary towns	• Assisting 12 communities and 4 local governments to work as partners in improving neighborhood environmental conditions • Analytical study to establish links between urban poverty and environmental degradation • Training and dissemination of findings for replication by other local governments	0.45 million To be completed in December 2000
4. Urban Environmental Management				
a. Bangkok Air Quality Management Project	BMA *OECF, DANCED*	To reduce air pollution from transport sources in Bangkok	• Fuel switch/engine conversion of high circulating vehicles including BMTA buses • Phasing out of 2 stroke engines • Dust control measures to reduce PM_{10} • Expanding the air quality monitoring network • Strengthening the capacity of BMA and PCD	60–80 million Loan effectiveness: September 2000
b. Bangkok Waste Management Project	BMA *OECF, USAID*	To improve the water quality of lower reaches of Chao Phraya River	• Construction of sewage collection and treatment scheme in Klong Toey or Thonburi • Construction of sanitary landfills for the Bangkok Metropolitan Region • Improving the staff capabilities of BMA	200–300 million Loan effectiveness: September 2001
5. Natural Resources Management				
a. Natural Resource Management Project	MoAC *ADB*	To improve the long-term management of Chao Phraya River Basin	• Creation of Chao Phraya Basin Organization • Watershed protection and dam safety in the upper basin • Modernization of irrigation management • Improved groundwater management	300 million Loan effectiveness: March 2001
6. Responding to International Obligations				
a. Montreal Protocol	Private Enterprises *The World Bank*	To reduce emissions of ODS	• Assisting enterprises to modernize their manufacturing technologies and processes • Phasing out harmful raw materials	Ongoing project
b. Chiller Project	EGAT *The World Bank*	To simultaneously reduce the emission of GHG and ODS	• Pilot the introduction of a joint approach in the energy sector • Modernize chiller technology	5 million Loan effectiveness: June 2000

Annex A

World Bank Involvement in Thailand

Unlike that for other countries in the region, World Bank involvement in Thailand's environmental activities has been limited. Most support has been in the context of energy, rural and transport sector activities. The rural development program has provided the primary focus for issues related to degradation of natural forests, upland agricultural areas, biodiversity conservation and coastal zone management. Energy efficiency, fuel switching and particulate matter reduction have been addressed through energy and transport sector operations.

Analytical work supported by the Bank includes the following. The *Thailand Fuel Option Study* (1993) analyzed the energy sector and environment-related issues. The report suggests cost-effective fuel options to help Thailand meet its energy requirements over the next two decades. The CEM report, *Thailand: Mitigating Pollution and Congestion Impacts in a High-Growth Economy* (1994), builds on the 1993 report and gives an exhaustive analysis of the environmental impact of economic growth. Its conclusions suggest that rapid economic growth has exacerbated many environmental problems and that the high levels of air pollution and traffic congestion impose significant costs through their impact on productivity and health. The report, *Successful Conversion to Unleaded Gasoline in Thailand* (1998) describes the country's success in phasing out lead from gasoline at a net cost of $0.02 per liter through a series of policy initiatives.

Under the auspices of the GEF, the World Bank has supported the energy sector and its effects on the environment through the *Promotion of Electricity Energy Efficiency and Metropolitan Distribution Reinforcement Project* (1993). The project's two main objectives are to (i) build sufficient institutional capability in the Thai electric power sector and energy-related private sector to deliver cost-effective energy services throughout the economy; and (ii) pursue policies and actions leading to the development, manufacture and adoption of energy-efficient equipment and processes within the country. The Project consists of a five–year DSM Plan to achieve a 238–megawatt reduction in peak demand and 1,427 GWh of

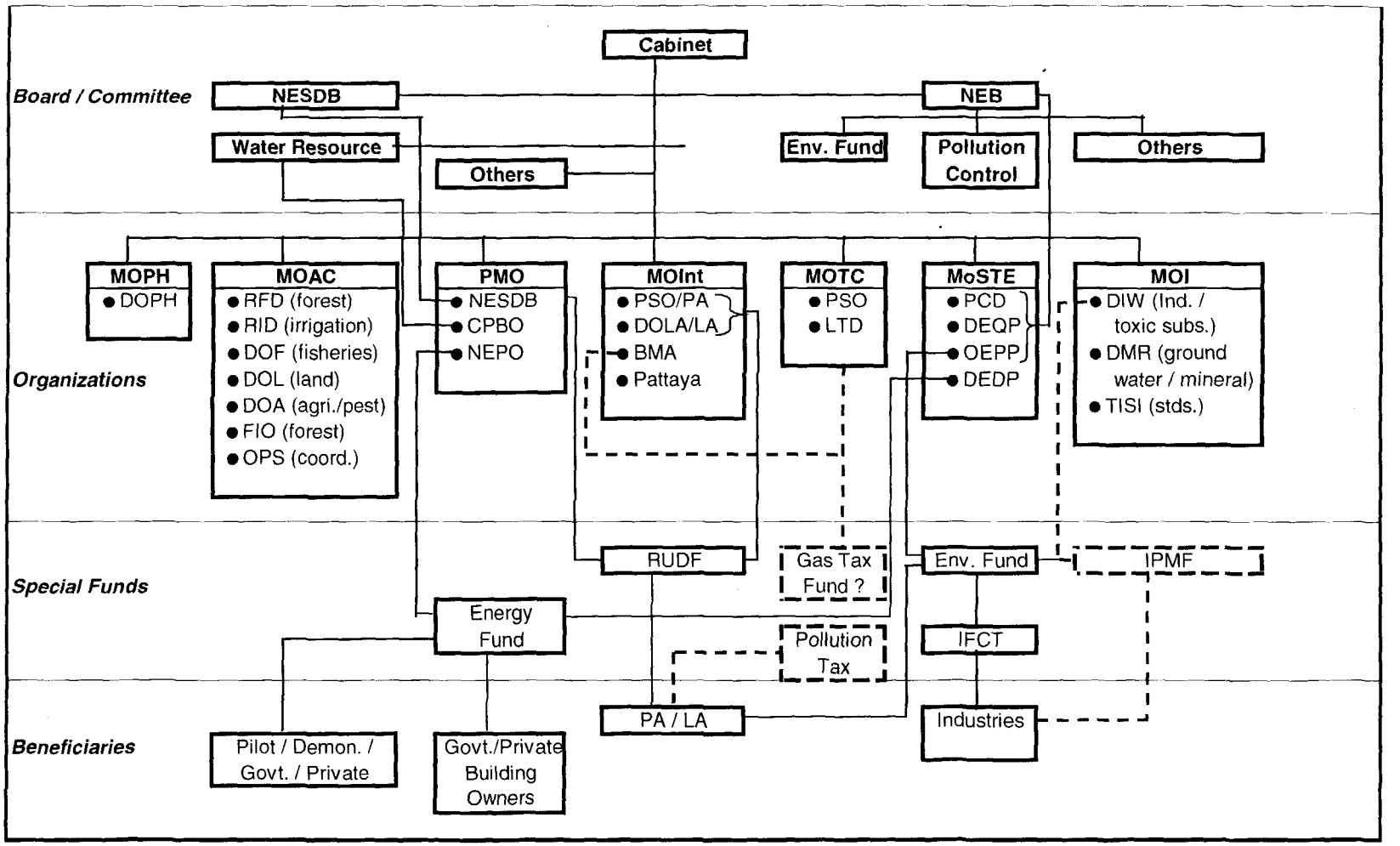
electricity savings per year, thereby significantly reducing CO_2 emissions from electricity generation by the end of 1998. These activities, along with ongoing efforts by the World Bank to assist in the reform and restructuring of the power sector, have stimulated interest in private energy services and, in particular, the development of ESCOs. EGAT (with GEF assistance) is now developing four pilot industrial ESCO projects for concessional financing under the Energy Conservation Promotion Fund. EGAT expects to have all four projects ready for implementation before December 1999.

During the 1990s, assistance was provided in the rural sector through three Land Titling operations. These projects have contributed substantially to better management of lands, including the mapping of permanent forestland. The different energy sector operations (to be expanded) contributed to improving energy efficiency and DSM, reducing emissions from power plants and fuel reformulation, and switching to unleaded gasoline. Through the highway sector operations, the World Bank provided assistance to improve air quality conditions in Bangkok. While the rural and energy sector operations made positive environmental impacts, the highway sector operations could not fully realize their environmental goals.

The *Social Investment Project* would support efforts to minimize the short-term reverse migration to rural areas due to the crisis and improved management of land use and protected areas.

A recently completed review of the FY98 Thailand project portfolio shows that the relatively poor performance for FY98 across the entire portfolio can be partially attributed to the financial crisis but also, and more directly, to endogenous variables such as project management, procurement problems and financial management inadequacies. The only environmental project included in the Thailand portfolio for FY98 was the *Land Titling III Project*, which has allowed substantive improvements in land planning, management and use.

Institutional Structure for Environment



Abbreviations : **BMA** - Bangkok Metropolitan Administration, **CPBO** - Chao Phaya River Basin Organization, **DEDP** - Department of Energy Development and Promotion, **DEQP** - Department of Environmental Quality Promotion, **DIW** - Department of Industrial Works, **DMR** - Department of Mineral Resources, **DOA** - Department of Agriculture, **DOF** - Department of Fisheries, **DOL** - Department of Land, **DOLA** - Department of Local Administration, **DOPH** - Department of Public Health, **FIO** - Forest Industry Organization, **IFCT** - Industrial Finance Corporation of Thailand, **MoSTE** - Ministry of Science, Technology and Environment, **MOTC** - Ministry of Transport and Comunications, **NEB** - National Environment Board, **NEPO** - National Energy Policy Office, **NESDB** - National Economic and Social Development Board, **OEPP** - Office of Environmental Policy and Planning, **OPS** - Office of the Permanent Secretary for Agriculture and Cooperatives, **PA/LA** - Provincial/Local Authorities, **PCD** - Pollution Control Department, **PMO** - Prime Minister's Office, **PSO** - Permanent Secretary's Office, RFD - Royal Forest Department, RID - Royal Irrigation Department, RUDF - Regional Urban Development Fund, TISI - Thai Industrial Standards Institute - - does not yet exist

Annex C

Environmental Legislation

Ministry of Agriculture and Co-operatives

1901 Settle Salasagne's Nest To Be Forbidden Act

1903 Canal Maintenance Act

1913 Prapa Canal Act

1939 Private Irrigation Act

1941 Forest Act

1942 National Irrigation Act

1947 Fishery Act

1960 Wild Animal Conservation and Protection Act

1961 National Park Act

1964 National Forest Reserve Act

1974 Agricultural Land Management Act

1975 Agricultural Land Allotment Act

1975 Fertilizer Act

Ministry of Transport and Communication

1913 Water Transportation in Thai Gulf Act

1979 Land Transportation Act

Ministry of Interior

1921 Wild Life Sanctuary Act

1938 Cemetery and Crematorium Control Act

1942 Municipal Act

1950 Advertising by Amplifier Control Act

1952 Sanitary Act

1954 Land Act

1975 City Planning Act

1978 Road Traffic Act

1979 Building Control Act

1979 Vehicle Control Act

Ministry of Science, Technology and the Environment

1953 National Energy Act

1961 Atomic Energy for Peace Act

1992 Energy Reserve Promotion Act

1992 National Environmental Quality Maintenance and Promotion Act

Ministry of Education

1961 Ancient Remains, Arts and National Museum Act

Ministry of Public Health

1941 Public Health Act

1964 Food Control Act

1967 Medicine Act

1974 Cosmetics Act

Medical Equipment Act

1992 Public Health Act

Ministry of Industry

1918 Mining Act

1967 Mineral Act

1969 Factory Act

1973 Petroleum Act

1978 National Petroleum Act

1979 The Industrial Estate Authority of Thailand Act

1990 Evaporation Substance Protection Used Regulation

1992 Factory Act

1992 Hazardous Equipment

Environmental Protection Budget (million Baht) by Ministry 1996 – 1998

Organization Responsible	Water Pollution			Air & Noise Pollution			Solid & Hazardous Waste			Others (Management)			Totals
	1996	1997	1998	1996	1997	1998	1996	1997	1998	1996	1997	1998	
MoAC	**12**	**26**	**51**						**95**	**63**	**75**		**322**
1. Department of fisheries	12	26	51										89
2. Department of agriculture									95	63	75		233
MoInt	**4,671**	**5,271**	**3,048**				**721**	**629**	**626**				**14,967**
1. BMA	2,597	3,272	1,478				54	68					7,470
2. DIW	2,074	1,999	1,570				667	466	532				7,307
3. DLA								95	24				190
MoSTE	**86**	**587**	**2,257**	**248**	**344**	**160**	**69**	**167**	**174**	**2,303**	**2,316**	**122**	**8,834**
1. PCD	86	587	99	248	344	160	69	167	38	97	80	80	2,055
2. DEQP										30	23	3.2	56
3. OEPP			2,157						136	2,174	2,213	38	6,719
4. Institute of Scientific and Technological Research										2.4			2
5. Office of Atomic Energy and Peace												1.5	2
Ministry of Public Health	**1,146**	**1,317**	**1,156**	**33**	**9**		**6**	**35.6**	**14**			**282**	**3,998**
1. Department of Medical Services	1,096	2	2				3.2	35	14				1,152
2. Department of Health	50	33		33	9		3.3	0.2				282	410
3. Office of Permanent Secretary		1,282	1,154										2,436
MoInd	**22**	**20**	**53**	**139**	**43**		**395**	**469**	**246**	**20**			**1,407**
1. DIW	22	20	53	20	20		395	469	229	20			1,248
2. Thai Industrial Standard Institute				119	23								142
3. Department of Mineral Resources									17				17
Ministry of Transport and Telecommunication			**52**	**51**	**3.9**								**107**
1. Department of Land Transport			52										52
2. Office of Permanent Secretary				51	3.9								55
MoUA	**12**	**38**	**17.6**				**1.5**						**69.1**
1. MoUA	12	38					1.5						51.5
2. Ubon University			7.6										8
3. Mahidol University			10										10
TOTAL *(rounded up)*	**5,948**	**7,259**	**6,583**	**472**	**447**	**164**	**1,193**	**1,301**		**2,386**	**2,391**	**404**	**59,051**

Annex E

International Assistance in the Environmental Sector

Environmental projects and programs feature in the profiles of twenty donor organizations in Thailand. These include: ADB, AusAid (Australia), BGR, Brot Für Die Welt (Germany), Care International, CIDA (Canada), CIM, DANCED (Denmark), the European Union, France, GTZ (Germany), JICA (Japan), NEDO, NIDO, DCD (Belgium), Sida, the Thai-German Foundation, the United Kingdom, the UN Agencies, and the World Bank.

A wide range of environmental and natural resources management issues is covered by donor-assisted activities. Bilateral donors in particular contribute substantially towards strengthening the depth and breadth of coverage of environmental areas. Several donor agencies pursue long-term strategies within a sector, emphasizing components such as capacity building, awareness creation, and development of institutional maturity and strength. The environmental assistance strategies adopted provide useful lessons for improving the effectiveness of future environmental assistance to Thailand. A major trend in foreign assistance at a global level is the importance placed on cooperation and coordination among donors. Discussions with donor organization representatives revealed that there are clear advantages as well as reservations about such coordination.

Donors are working together to improve coordination on environmental technical assistance, policy advice and lending to reduce overlap in assistance to certain sectors; to develop and adopt programmatic approaches for lending that will benefit the country as well as ensure the effective use of resources; and to improve and refine the information available about activities, experiences and problems faced by various donors. The donor community in Thailand supports the vision of long-term assistance strategies that are mutually compatible, build on specific advantages of each donor, and contribute to overall effectiveness of aid. However, practical mechanisms for effective donor consultation are yet to be created and successfully implemented in Thailand.

A profile of environmental assistance by the donors is given in Table E–1, while Table E-2 contains summary information about ongoing donor-assisted projects.[39]

Table E–1.
Donor Activities in the Environmental Sector

Donor Organization	Major Area of Assistance	Number of Projects
ADB	Integrated water resource management; Solid waste and wastewater management	5
AusAid (Australia)	Forest and coastal resource management; Agricultural research and development	14
BGR	Natural resource management; Solid waste management	2
Brot Für Die Welt	Natural resource management and conservation; Agriculture sector	4
Care International	Integrated natural resource management	1
CIDA (Canada)	Natural resource management	2
CIM	Hazardous waste management; Natural resource management	6
DANCED (Denmark)	Natural resource management; Forest resource management; Solid waste, water and sanitation management; Pollution control; Community-based environmental management	17
EU	Environmental Management	2
France	Agricultural research and development	1
GTZ (Germany)	Urban environmental management; Solid waste collection and management; Industrial pollution control; Renewable energy and energy efficiency; Agriculture sector	13
JICA (Japan)	Natural resource management; Industrial wastewater management; Integrated water resource management; Air pollution control from traffic sources; Agriculture sector	10
NEDO	Industrial pollution control	1
NIDO	Water resource management	1
DCD (Belgium)	Agricultural research and development	1
Sida	Air quality management	2
Thai-German Foundation	Micro-finance for agriculture	1
United Kingdom	Coastal and freshwater resource management	1
The World Bank	Coastal and freshwater resource management; Energy efficiency; Clean fuels	3

39 The tables reflect a preliminary view of international assistance in the environment and natural resources sector. They will be updated in subsequent discussions with the RTG, donors, and NGOs.

Table E-2.
Ongoing Donor-Assisted Projects

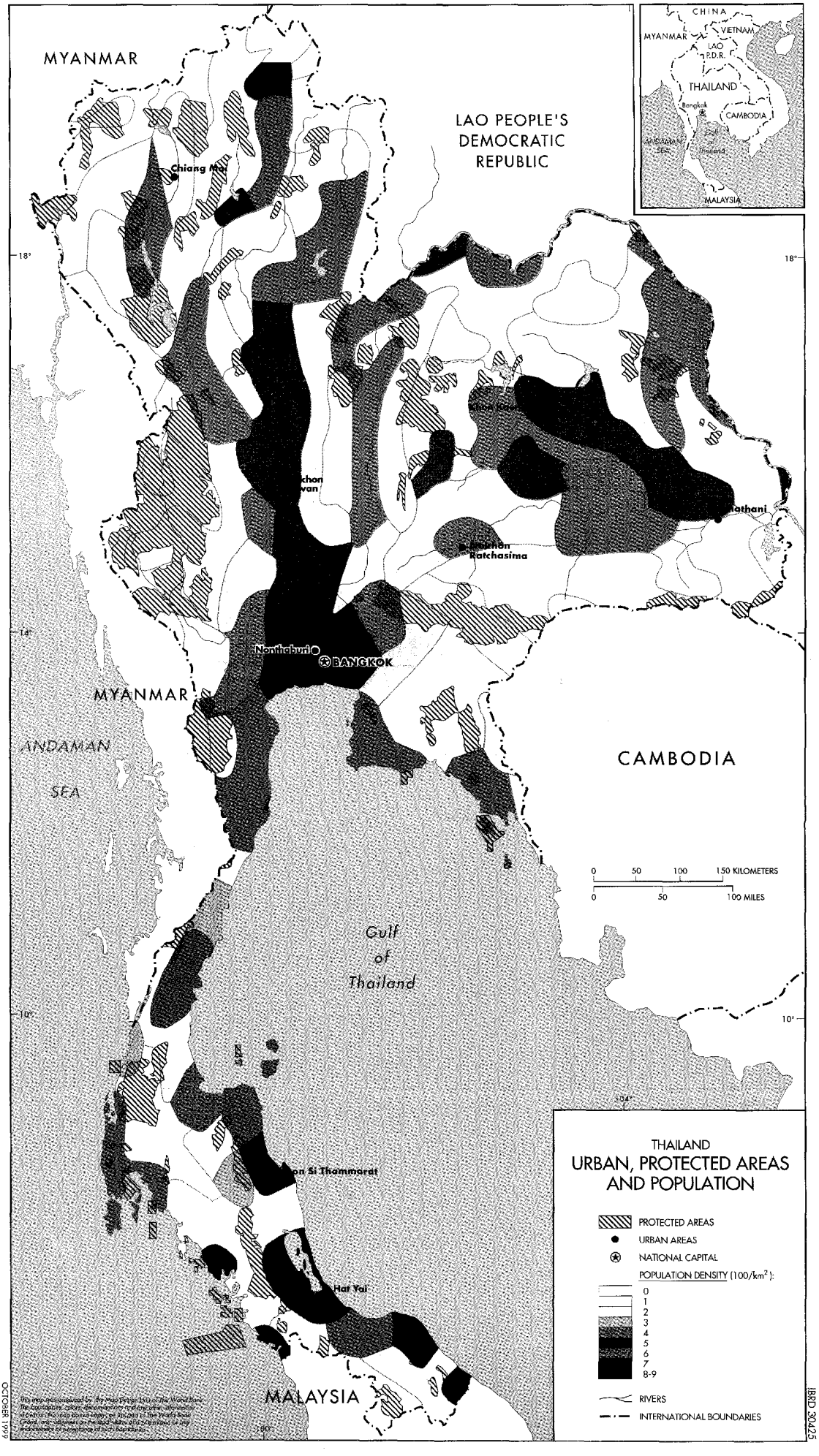
Organization	Project	Partner	Duration
ADB	Northeast Region Water Supply	MoInt, PWA	
ADB	Nong Khai-Undon Thai Water Supply Project	MoInt, PWA	
ADB	Samut Prakarn Wastewater Management	MoSTE, PCD	
ADB	Solid Waste Management	MoSTE, PCD	
ADB	Bangkok Metropolitan Region Waste Management	MoSTE, PCD	
AusAid	Potential Insect Threat to Plantations of Acacias and Eucalyptus in Tropical Asia	MoAC, RFD	1999
AusAid	Genetic Diversity and Propagation of Mangroves	MoAC, RFD	2000
AusAid	Economic Valuation of the Thailand/Australia Collaborative Project funded by ACIAR Stage II	MoUA	1999
AusAid	Carbon Dynamics, Nutrient Cycling and the Sustainability of Cropping and Pasture Systems	MoAC, RFD	1999
AusAid	Genetic Improvement of Thai Beef Cattle & Buffalo Detection Strain Differentiation for Plant Pathogenic Mycoplasma	MoAC, DLD	2001
AusAid	Control of Papaya Ringspot Virus in Papaya and Cucurbits through Transgenic Resistance	MoAC	2000
AusAid	Plant Breeding Strategies for Rainfed Lowland Rice in Northeast Thailand and Laos	MoAC	1999
AusAid	Minimizing Disease Impacts on Eucalyptus in South East Asia	MoAC, RFD	2000
AusAid	Agrochemical Pollution of Water Resources under Tropical Intense Agriculture Systems	MoUA	2000
AusAid	Low Cost Disinfestation Systems for Fruit Agriculture Regulatory Division	MoAC	2001
AusAid	Adaptation of Low-Chill Temperature Fruits to Australia and Thailand	MoAC	2000

Organization	Project	Partner	Duration
AusAid	Integrated Control of Citrus Pests in Thailand	MoAC	2000
AusAid	Development of Domesticated Strategies for Indigenous Tree Species	MoAC	2000
AusAid	Diagnostic Tests and Epidemiological Probes for Prawn Viruses in Thailand and Australia	MoUA	2001
BGR	Environmental Geology for Regional Planning	MoInt, MoSTE	1999
BGR	Site Investigations Waste Disposal Site	MoInd, MoSTE	
Brot Für Die Welt	Project for Ecological Recovery		1998
Brot Für Die Welt	Technology for Rural and Ecological Enrichment		1999
Brot Für Die Welt	Appropriate Agriculture & Horticulture		2000
Brot Für Die Welt	Development of Appropriate Agriculture and Natural Resources		1999
Care International	Integrated Natural Resource Conservation Project	MoAC, RFD	1999
CIDA (Canada)	Thailand Trilateral Environmental Project	OPM	1999
CIDA (Canada)	Natural Resource & Environmental Management	DPA Group Several Thai Ministries	1999
CIM	Adviser Biological Plant Protection	MoAC	
CIM	Director of AEETC	MoSTE, DEQP, EU	
CIM	Head of Laboratory Water	MoSTE, PCD	
CIM	Adviser Environmental Protection	MoSTE, PCD	
CIM	Adviser Management of Hazardous Substances	MoSTE, PCD	
CIM	Natural Resource Manager and Ecoregion Coordinator	MoUA	
DANCED	TRUEPM Project		
DANCED	Support for BMA Improvement of Solid Waste Collection Management	BMA	2000

Organization	Project	Partner	Duration
DANCED	Environmental Strengthening of BMA	BMA	1999
DANCED	Huai Kha Khaeng Complex: Integrated Conservation and Development	MoAC	1999
DANCED	Save Use of Pesticides	MoAC	1999 ?
DANCED	Sustainable Agriculture	MoAC	2000
DANCED	Sustainable Shrimp Aquaculture	MoAC	2003
DANCED	Upper Nan Watershed Management	MoAC	2000
DANCED	Forest Genetic Resources Conservation and Management	MoAC	2000
DANCED	Cleaner Technology Capacity Building in DIW	MoInd, DIW	2001
DANCED	Urban Community Environmental Fund: UCEF	MoInd, DIW	1999
DANCED	Energy Efficiency Promotion for SMEs	MoSTE	
DANCED	Environmental Management Samut Prakarn	MoSTE	
DANCED	Samut Prakarn Waste Water Management	MoSTE, DIW	1999
DANCED	Songklah Lake Environmental Management	MoSTE, OEPP	
DANCED	Community Forestry Training Development Support: RECOFTC	MoUA	2000
Denmark	Supply of a Marine Research Vessel for Phuket Marine Biological Center	MoAC, RDF	2000
EU	EU-ASEAN Programme: AEETC	MoSTE, DEQP	
EU With CDG	Promotion for the Introduction of Environmental Management Systems in Thai Industry	AIT, ASEP Programme	
France	Oriented Research on Agrarian System	MoUA	2000
GTZ	Biological Control of Rodents	MoAC	2001
GTZ	Appropriate Regulatory Measures & Policy Reform for Pesticide Risk Reduction	MoAC	
GTZ	Environmental Advisory Assistance for the Industry	MoInd, DIW	

Organization	Project	Partner	Duration
GTZ	Air Pollution Control	MoInd, DIW	
GTZ	Urban Environmental Management	MoInt	
GTZ	Thai German Energy Efficiency Promotion	MoSTE	
GTZ	Commercialization of Solar Energy Applications	MoSTE	
GTZ	Chemicals Management	MoSTE	
GTZ	Environmental Technology Competence	MoSTE, PCD, MoUA	
GTZ	RISE AT	MoUA	
GTZ	Solid Waste Management		
GTZ	Disaster Management for the Transportation of Hazardous Substances	OPM, NESDB	
GTZ	Transport Policy and Planning Assistance	ESCAP	
JICA	Soil Management Technique	MoAC	
JICA	Automotive Research for Environmental Improvement	MoInd	2000
JICA	Industrial Water Technology Institute	MoInd, DIW	2000
JICA	Automotive Fuel Research Project for Environmental Improvement	MoInd, DIW	2000
JICA	Training Center for Sewage Works	MoInd, PWA	
JICA	Country Training Program on Water Supply Technology	MoInd, MWA, PWA	
JICA	National Waterworks Technology Training Institute	MoInd, MWA, PWA	
JICA	Training for Sustainable Highland Agriculture Development	MoUA	2001
NEDO	Cleaner Production		
NIDO	River Management Planning	MoSTE, PCD	
DCD (Belgium)	Improvement of Tapioca Starch Production		1999
Sida	Air Quality Management	MoSTE	
Sida	Enhancement of the Air Quality Management Project to Four Regional Nodes	MoSTE	2000

Organization	Project	Partner	Duration
Thai-German Foundation	Micro-Credit Projects in the Field of Integrated Farming, Fruit Tree Planting	MoInt	
United Kingdom	South East Asia Regional : Aquatic Disease Control	MoAC	
World Bank	Clean Fuels	MoSTE	
World Bank	Natural Resources Strategy	MoAC	
World Bank	EGAT	MoSTE	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CAMBODIA
ANDAMAN SEA
Gulf of Thailand
MALAYSIA
Chiang Mai
Chiang Rai
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Nonthaburi
BANGKOK
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ANDAMAN SEA
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18°
14°
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100°
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URBAN, PROTECTED AREAS AND POPULATION
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NATIONAL CAPITAL
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OCTOBER 1996
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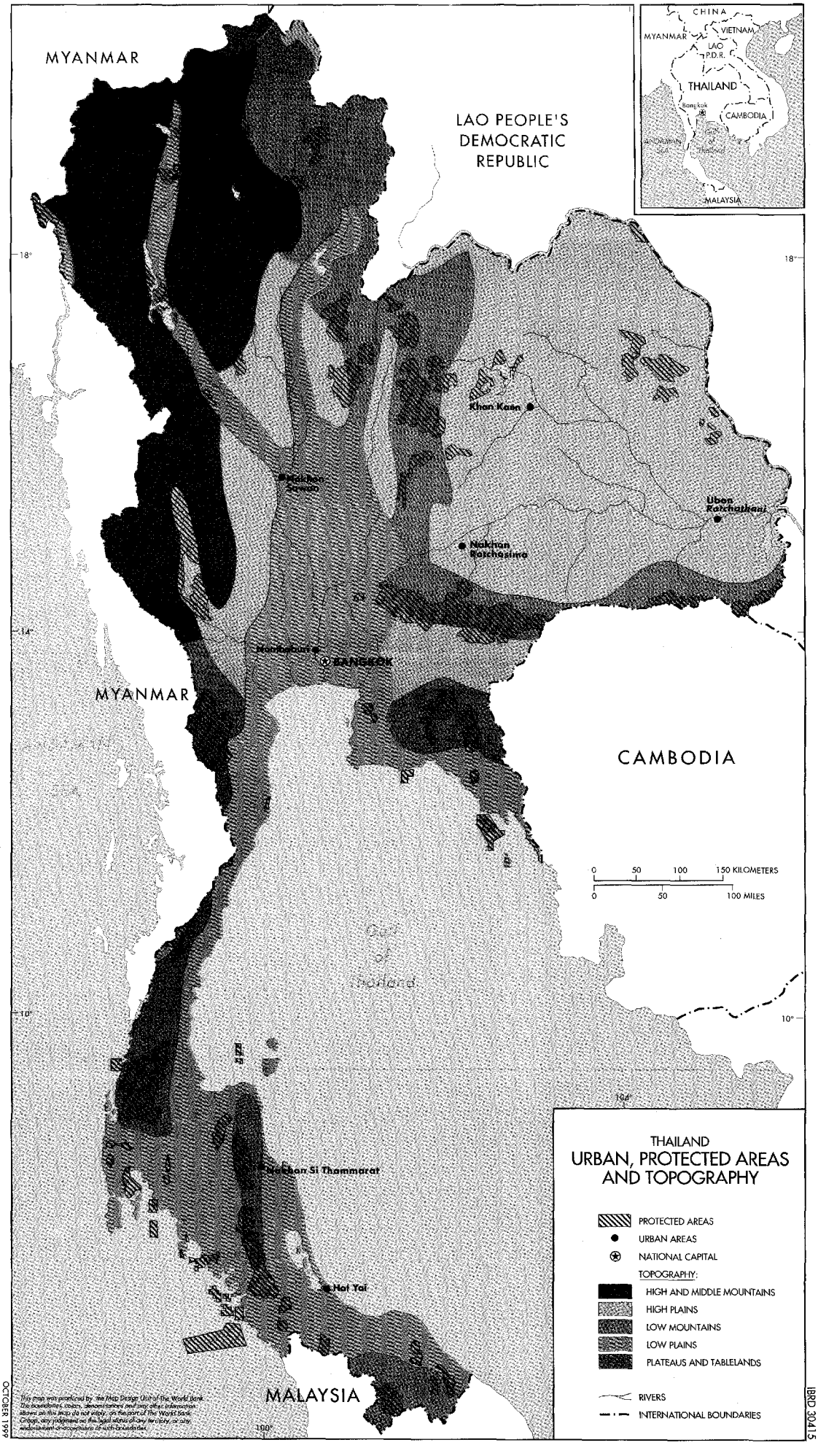
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BANGKOK
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Gulf of Thailand
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Hat Yai
MALAYSIA
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URBAN, PROTECTED AREAS AND TOPOGRAPHY
PROTECTED AREAS
URBAN AREAS
NATIONAL CAPITAL
TOPOGRAPHY:
HIGH AND MIDDLE MOUNTAINS
HIGH PLAINS
LOW MOUNTAINS
LOW PLAINS
PLATEAUS AND TABLELANDS
RIVERS
INTERNATIONAL BOUNDARIES
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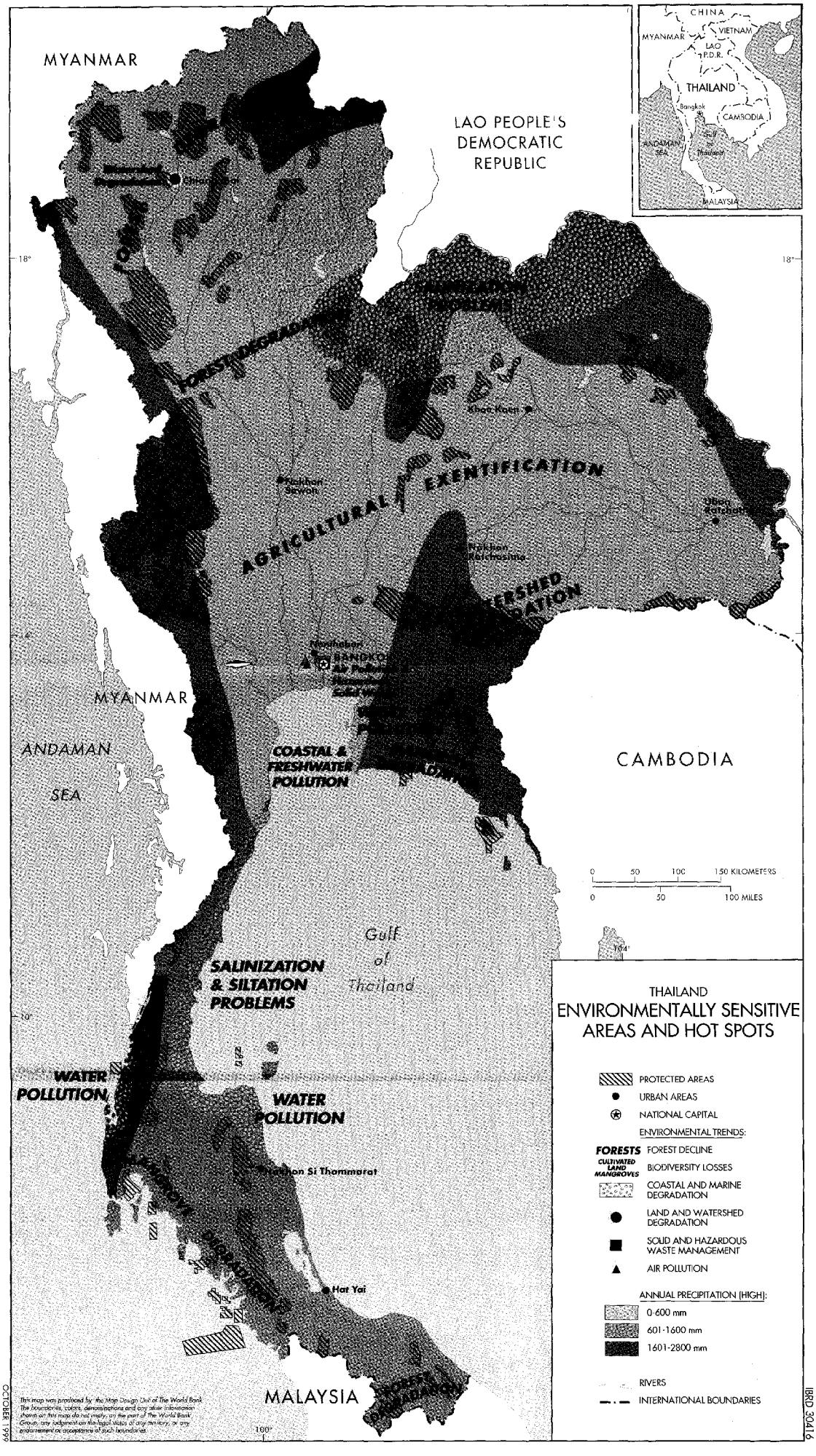
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ENVIRONMENTALLY SENSITIVE AREAS AND HOT SPOTS
PROTECTED AREAS
URBAN AREAS
NATIONAL CAPITAL
ENVIRONMENTAL TRENDS:
FORESTS FOREST DECLINE
CULTIVATED LAND MANGROVES BIODIVERSITY LOSSES
COASTAL AND MARINE DEGRADATION
LAND AND WATERSHED DEGRADATION
SOLID AND HAZARDOUS WASTE MANAGEMENT
AIR POLLUTION
ANNUAL PRECIPITATION (HIGH):
0-600 mm
601-1600 mm
1601-2800 mm
RIVERS
INTERNATIONAL BOUNDARIES
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