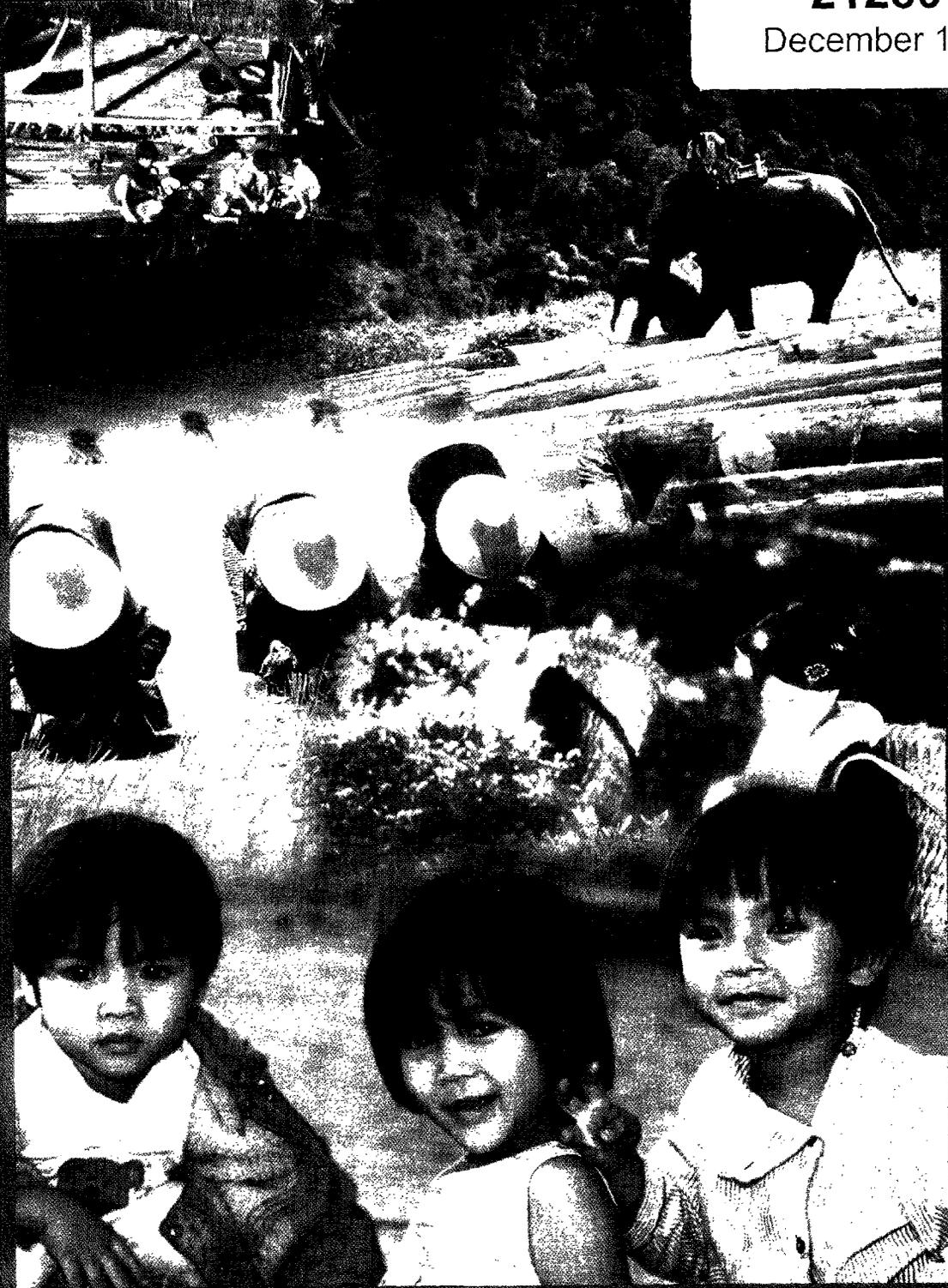


Building Partnerships for Environmental and Natural Resources Management

Thailand

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December 1999



Environment Sector Strategy Note

Thailand

Building Partnerships for Environmental
and Natural Resources Management

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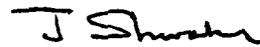
Thailand's abundant and diverse natural resources have sustained its people for many centuries and formed the backbone of its prosperity over the last thirty years. However, economic expansion was accompanied by serious environmental costs. As the country moves forward into the new millennium, it faces 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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This document outlines a partnership strategy forged by the Royal Thai Government and the World Bank for the protection and management of natural resources and the environment. The Ministry of Science, Technology and Environment (MoSTE), representing the Royal Thai Government, and the World Bank engaged in close dialogue and consultation with Government ministries and agencies, civil society, academia, the private sector and donor institutions to draft this strategy. The Ministry of Agriculture and Cooperatives (MoAC) and the Department of Industrial Works (DIW) are the other key government agencies who will play an important role in implementing the strategy.

The strategy elaborates upon and reinforces the environmental objectives specified in three existing planning documents: Thailand's Eighth National Economic and Social Development Plan; the 20-year Policy and Perspective Plan for Enhancement and Conservation of National Environmental Quality; and the World Bank's Country Assistance Strategy for Thailand, 1998-2001.

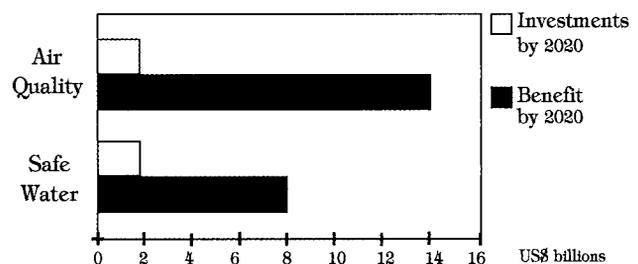
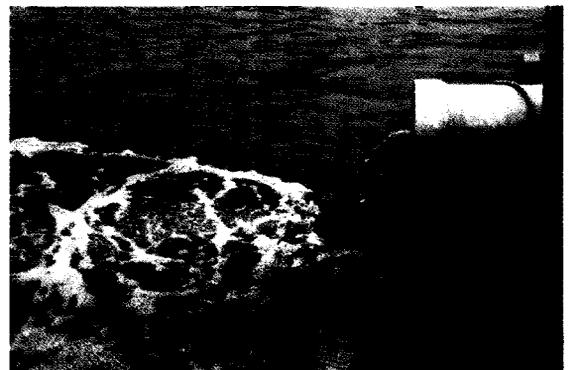
This document is a concise presentation of the publication, ***“Thailand: Building Partnerships for Environmental and Natural Resources Management,”*** This abridged version provides an introduction to the state of the environment in Thailand, highlights current trends and responses, and sets forth the major challenges that Thailand faces in its efforts to reverse the environmental decline of the last few decades. In addition to this, key areas for environmental improvements are identified through five strategic themes. The document is intended for the use of policymakers, Government agencies, nongovernmental organizations, civil society, and academic institutions.

Thailand's rapid economic growth over the last three decades has produced impressive achievements in people's welfare—higher incomes, lower infant mortality rates, improved life expectancy at birth, greater literacy, and expanded employment opportunities. However, this economic expansion has been accompanied by substantial environmental costs. Nearly half the forest cover was lost, more than a third of surface water is considered unsuitable for human consumption or agricultural use, atmospheric particulate matter in Bangkok consistently exceeds ambient standards and over-harvesting of marine fisheries has reduced fishing yield by tenfold.

Recent health care cost estimates by the World Bank indicate that the citizens of Bangkok are suffering the consequences of environmental decline both in terms of higher incidence of illness and percentage of income spent on medical care. Increased exposure to air pollution costs city residents about 8-10 percent of their annual income, and this is expected to rise to 20 percent in the next two decades. Similarly, urban households spend more than 10 percent of their income on access to safe water.

By 2020, Thailand will need to invest approximately US\$1.5 to 2 billion to attain universal coverage for safe water and sanitation. The corresponding economic benefits of such investments will be around US\$9 billion. Investments required for improving air quality are estimated at US\$660 million to 1.5 billion over a twenty year period, with resultant economic benefits expected to be ten times that amount.

To address these and other mounting environmental challenges, the Government and local communities have undertaken several initiatives. They have established legal and institutional frameworks for environmental governance, prepared a 20-year Policy and Perspective Plan for Enhancement and Conservation of National Environmental Quality, phased out leaded gasoline, improved energy efficiency, invested in water pollution abatement and declared a large number of sensitive habitats as protected areas.



Key Environmental and Natural Resources Management Institutions in Thailand

Ministry of Science, Technology and Environment (MoSTE):
Pollution Control Department (PCD), Office of Environmental Policy and Planning (OEPP), Department of Environmental Quality and Promotion (DEQP)

Ministry of Agriculture and Cooperatives (MoAC):
Royal Forestry Department, Royal Irrigation Department and Natural Resources and Biodiversity Institute

Ministry of Industry (MoInd):
Department of Industrial Works (DIW)

Ministry of Interior (MoInt):
Department of Local Administration (DOIA) and the Bangkok Metropolitan Administration (BMA)

Ministry of Transport and Communications (MoTC):
Land Transport Department

Thailand's environmental protection laws are built around the amended 1992 National Environmental Quality Act. Numerous agencies are responsible for environmental protection, with the National Environment Board having ultimate authority for policy making (see sidebar on environmental institutions in Thailand). Through development of their Provincial Environmental Action Plans, local governments are also becoming more involved in environmental management. The 20-year Plan is intended to serve as a "blueprint" for integrating development priorities with the broader environmental goals set out in the new Constitution and the Eighth National Plan.

The economic crisis threatens to cut short efforts to improve environmental conditions and may even cause Thailand to negate some of its 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 has forced industrial and municipal treatment facilities to cut back operations, including investments in cleaner production. The Government has reduced budgetary allocations for environmental protection by about 20 per cent from 1996 levels, thus affecting pollution control and natural resources conservation programs.

Major Donor Agencies in the Environment Sector

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
CIDA	Canadian International Development Agency
DANCED	Danish Cooperation for Environment and Development
EU	European Union
GTZ	German Technical Cooperation Agency
JICA	Japan International Cooperation Agency
JBIC	Japan Bank for International Corporation
USAID	United States Agency for International Development

Trends

Issue	Overall Severity	Trend
Declining water 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, Sox, Nox and 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 down stream sedimentation
Declining marine and freshwater resources	Medium	* Significant reduction in catch per unit effort over 20 yrs. * 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 million 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.

Causes and Relative Contribution	Response	Donor Activities
* Domestic sewage (H) * Industrial effluent (H)	* US\$550M committed for waste water collection / treatment in BMA in 1998 * Pollution discharge standards	ADB; AusAid; DANCED; JBIC
* Irrigation (H) * Domestic (M) * Industrial (M) * Drought (L)	* Policy, institutional and regulatory framework for integrated water resources management completed	ADB; CIM; DANCED; JBIC
* 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; JBIC
* 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)	* Watersheds have been classified and mapped * Intended land use specified and regulated	BDW; BGR; CIDA; DANCED;JICA; NIDO;World Bank; JBIC
* Effluents and agricultural runoff (H) * Fishing practices (H)	* Programs developed for sustainable aquaculture and marine fisheries management * Targets established for mangrove reforestation and conservation	CIDA; DANCED; UK
* Land conversion for agriculture (H) * Soil erosion (H) * Land tenure (H) * Salinization (M)	* Improvements in land use management /planning * Forest encroachment reduced by areas designating appropriate 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 target set at 40% of land area * Investments in 1996 - as a % of GDP	AusAid; DANCED; JICA; World Bank

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 is of low quality, including the lower reaches of the Chao Phraya and Thachine rivers. Increased volumes of municipal and industrial waste are the main culprits. Public and private sector investments in wastewater management are impeded by the separation of wastewater management from water supply as a municipal service function in the Bangkok Metropolitan Region, and by lack of cost-recovery in water supply and quality improvements. 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 concentrations of ozone, hydrocarbons 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 declines in biodiversity. While significant additions to the protected area system are proposed, existing areas suffer from a lack of management.

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.

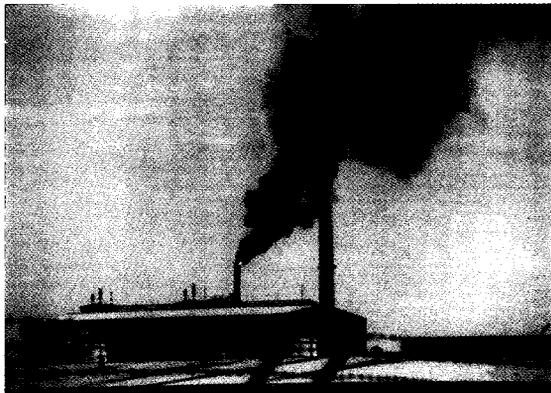


Improving Coastal Zone Management:

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.

Setting Priorities

Review:

1 A review of current environmental trends identified the most critical and visible environmental problems and challenges in the country.

Analyzing the Causes:

2 Through an iterative exercise, the underlying causes of these problems were established. The corresponding policy and institutional changes and investment needs were then determined.

Defining the Partnership:

3 The following guiding principles were used to define the objectives and scope of the partnership: (i) ensuring that environment remains a priority during the recovery period; and (ii) laying the foundation for an integrated approach to environmental management.

Framing the Strategy for Partnership:

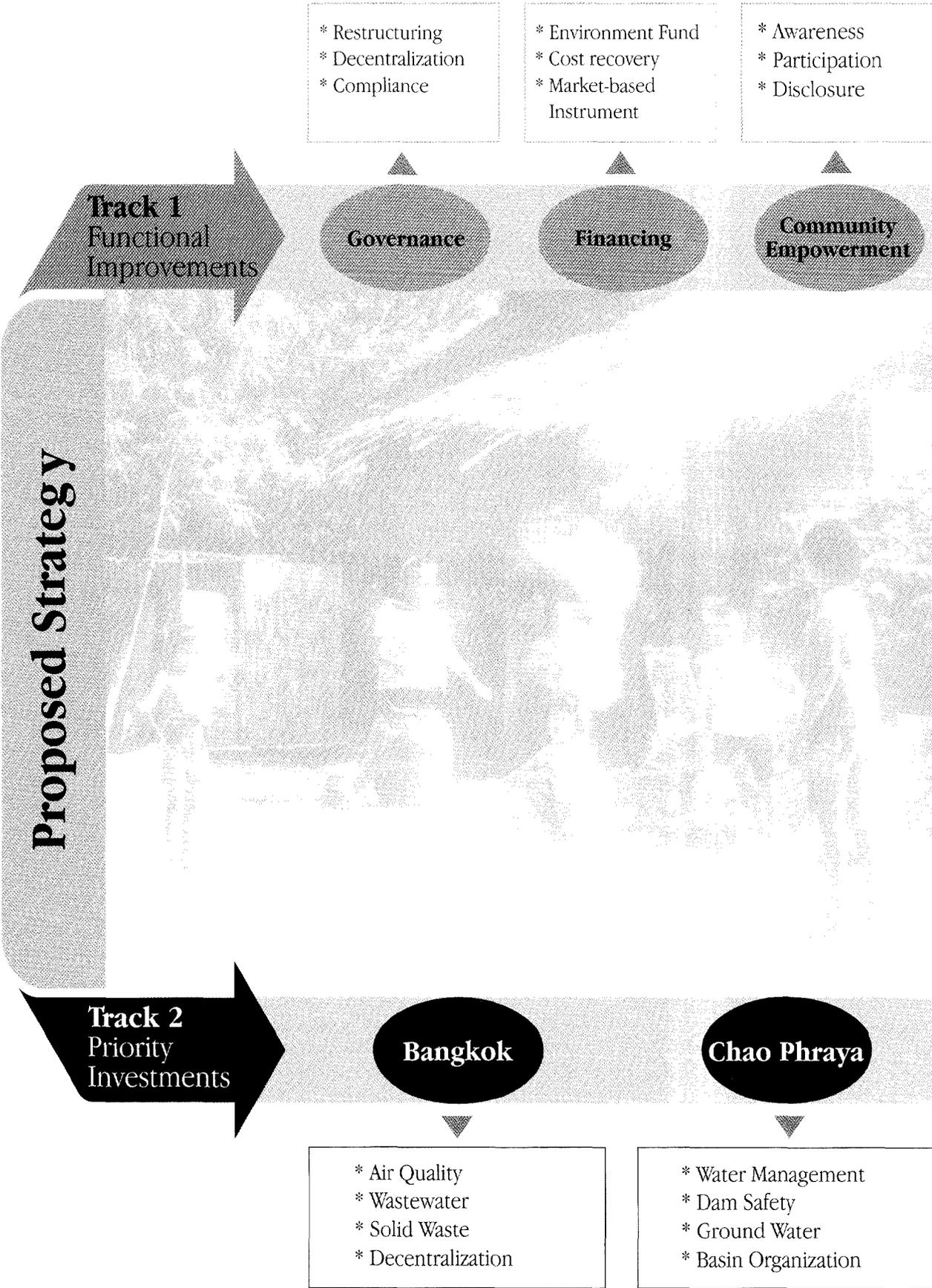
5 The final step in the priority-setting exercise was to outline the strategy. The resulting environmental strategy has two mutually complementary tracks, with Track 1 focusing on functional improvements and Track 2 on priority investments.

Targeting World Bank Assistance:

4 Three criteria were used to determine the priorities for World Bank assistance.

- * Consistency with policy objectives and opportunities for reform.
- * On-the-ground-impact (high cost of inaction)
- * Comparative advantage of World Bank involvement

Strategy



Strategic Theme 1

Environmental Governance. Weak public administration has long been recognized as a key obstacle to achievement of Thailand's development objectives. Public institutions responsible for environmental and natural resources management are highly segmented with little coordination among them. Compliance and enforcement functions are split among the Departments of Industrial Works, Pollution Control and Land Transport. This has led to poor implementation of the National Environmental Quality Act (NEQA). Non-compliance by polluters is widespread and current enforcement mechanisms suffer from inadequate procedures, institutional overlap, insufficient staff capacity, a lack of incentives and weak monitoring and reporting capability.

In recognition of these problems, the Government recently announced an ambitious public sector reform program to improve the function of public agencies. Environment and natural resources functions spread across different ministries will also be a part of the program. Furthermore, the new Constitution and NEQA state that environmental and natural resources management functions would be decentralized to provincial and local governments. Simultaneously, there is a greater awareness among communities, which are seeking to be more actively involved in protecting the environment.

Decentralization is relatively new to Thailand, however, and some immediate concerns must be addressed in order to ensure that devolution of environmental functions to the local level will yield the expected benefits. These include improvements to local-level planning in the context of Provincial Environmental Action Plans; building human resources capability in the provinces; and granting enforcement powers to provincial administrations.

Institutional refocus, decentralization of environment functions and strengthened compliance are critical for the Government to enhance its ability to formulate and implement policies and projects in a more responsive and cost-effective manner.



STRATEGY: Institutional restructuring, compliance and decentralization are core elements of the proposed strategy.

Institutional Restructuring. Individual agencies in MoSTE, MoAC and Ministry of Industry will benefit from restructuring, reengineering, and capacity-building. This restructuring will harmonize functions across agencies, clarify enforcement responsibilities, separate regulatory functions from those of promotion and development, strengthen monitoring and public disclosure, promote customer orientation in service delivery, promulgate required legal changes, and enhance staff skills.

Compliance. Governments throughout the world are adding new tools to their management portfolios to complement command-and-control measures. These include: MBIs and public disclosure tools (see strategic themes 2 and 3). The strategy will assist the Thai government to modernize its monitoring, enforcement and compliance mechanism by initiating regulatory reforms.

Decentralization. Article 290 of the new Constitution states that environmental and natural resources protection should be decentralized to local governments, and it recognizes a more central role for communities in decision-making. World Bank assistance will support these objectives. As a first step, the World Bank will assist the Government in strengthening the Provincial Environmental Action Plan process.

PROPOSED WORLD BANK INVOLVEMENT

Public Sector Reform Loan - PSRL In support of Government's recently announced reform program, PSRL will provide assistance for organizational development and restructuring to selected Ministries - including MoSTE, MOAC, MOInd. A high-level Experts Committee appointed by National Environment Board is overseeing the preparation of the reform plans.

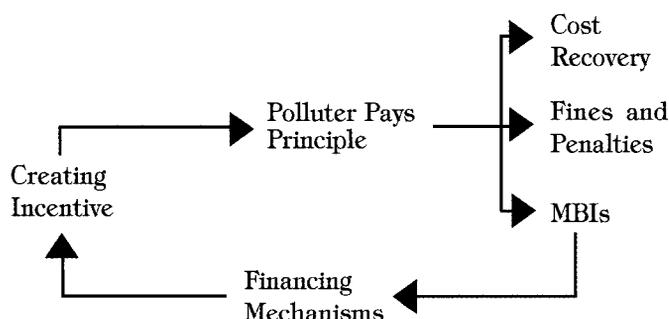
Environmental Institutions Development Project - EIDP The proposed project will supplement the Public Sector Reform Loan, and support MoSTE's capacity building needs as they emerge from the reengineering exercise. This project would be a multi-donor effort led by the World Bank. Components may include: (a) priority human resources development needs for reform efforts; (b) piloting decentralization models in selected provinces and strengthening the PEAP process; (c) regulatory reforms to improve compliance through the introduction of public disclosure tools; and (d) restructuring of the Environment Fund.

Sustainable Financing Mechanism. The implementation of the Polluter Pays Principle, although required by law, has yet to take effect. The DIW is working towards introducing market-based instruments (MBIs), primarily pollution charges on industrial emissions. Other agencies also are contemplating introduction of MBIs. It is important that efforts be coordinated to ensure overall effectiveness of these instruments. Careful attention should also be given to management of the revenues that they generate.

To date, cost-recovery of public investments in wastewater treatment plants and solid waste schemes has been seriously lacking. Operation and maintenance costs are often not covered by tariff structures. The problem is further compounded by the separation of water supply and wastewater. This denies opportunities for cross-subsidization as practiced elsewhere in the world.

Though established as a revolving mechanism, most of the assistance provided by the Environment Fund is in the form of grants. The Government intends to overhaul its operations as a priority, and should address two issues in particular: (i) the multiplicity of sources of funding, usually uncoordinated, for local government environmental investments; and (ii) poor cost-recovery. Both seriously limit the willingness of local administrators to borrow money for the provision of environmental services.

The introduction and application of MBIs and cost-recovery of services should be integrated into the functioning of the Environment Fund, thus creating a sustainable financing mechanism for environmental investments.



STRATEGY: As depicted in the figure, cost-recovery, monitoring and enforcement of regulations, pollution charges and a revolving Environment Fund need to be integrated in developing and implementing a sustainable financing mechanism. This is the main thrust of the strategy.

Market-Based Instruments. The strategy supports the introduction of MBIs in a phased manner, beginning with the pollution charge scheme of DIW. This should be a simple and transparent scheme with a clear and credible implementation program whereby at first, a small number of polluters and pollutants are targeted. DIW expects to be in a position to implement the scheme in early 2001.

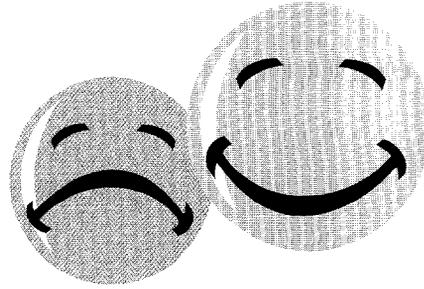
Cost-Recovery. The acceptance and endorsement of a cost-recovery strategy is an important stepping stone for improving the quality of environmental services. The strategy recommends that the Government urgently introduce cost-recovery measures. This should include (i) restructuring existing tariff charges that fail to reflect costs and actual use; (ii) merging water supply and wastewater into a single function; and (iii) encouraging private sector participation. As part of the decentralization efforts, provincial and local administrations should be assisted in developing sound financial management systems and staff with accounting skills.

Restructuring the Environment Fund. The strategy supports Government efforts to restructure the Environment Fund into a revolving mechanism. To do so, the following will need to be resolved: (i) administration of the Environment Fund; (ii) current financing mechanisms of provincial and local government investments; (iii) multiplicity of funds; and (iv) utilization of revenues generated through the application of MBIs.

PROPOSED WORLD BANK INVOLVEMENT

Environmental Institutions Development Project - EIDP (i) assistance will be provided for the restructuring and recapitalization of the Environment Fund, (ii) support for the implementation of the pollution charge scheme by assisting in the capacity building of DIW, PCD and private industry.

Strategic Theme 3



Community Empowerment. Local communities have had limited involvement in state-financed environmental protection activities. In the aftermath of the recent economic crisis, the Government signaled its interest in supporting community-based initiatives that would generate income for community members while simultaneously protecting and improving the environment. This policy shift reinforces Article 290 of the new Constitution, which advocates stronger public participation in environmental and natural resources management. Nevertheless, 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 a lack of technical and management skills. These criticisms and observations are widely recognized and accepted, and have helped to create the momentum for enacting policies that actively encourage broader and deeper participation by local communities in managing their environment.

Active participation of urban and rural communities in the planning, implementation, and monitoring of policies and programs will lead to increased environmental conservation and protection.





STRATEGY: Community participation and decentralization are two conjunctive elements of the Government's participatory strategy for environmental management.

Local Solutions for Local Problems. Community involvement is essential to improving environmental conditions. Most environmental problems that directly impact people—inadequate solid waste management, water treatment and

disposal, watershed management and water scarcity are local in nature. Experience from environmental initiatives has shown that locally devised solutions to commonly recognized problems are likely to be more sustainable.

Partnerships with Local Governments. The new Constitution clearly outlines the devolution of policy and financial responsibilities to provincial governments. Communities have always turned to their local officials for assistance and the restructuring will provide opportunities to strengthen local governments so that they may fulfill their new roles in environmental management.

Collaboration with NGOs and Bilaterals: 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.

PROPOSED WORLD BANK INVOLVEMENT

Technical Assistance. The PCD is receiving a technical assistance grant from the World Bank to implement a pilot program on empowering urban communities. This grant, supported by the Metropolitan Environmental Improvement Program, is financing (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 multi-agency steering committee is overseeing implementation of the program.

Social Investment Fund. The World Bank and Government have recently established a Social Investment Fund that 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. Specific components of this assistance are to be determined in the upcoming months.

EIDP. The EIDP will also enhance information disclosure on the impacts of existing and planned industrial plants, and involve local communities in environmental monitoring of the plants. Experience from Indonesia (PROPER), and Philippines (ECOWATCH), is likely to prove useful for this.

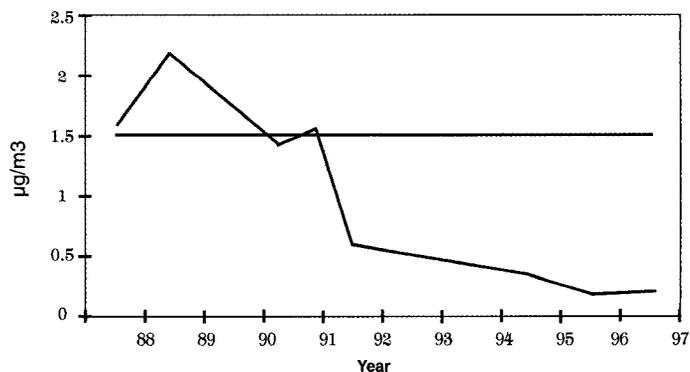
Air Quality and Waste Management in Bangkok. Bangkok has a third of the country's manufacturing enterprises and motor vehicle population. It is no surprise that this megacity is facing serious air and water pollution problems. Ozone and hydrocarbon concentrations, and suspended particulates including PM10 continue to exceed standards. The lower reaches of the Chao Phraya and Thachine rivers have reduced levels of biological activity caused by untreated municipal and industrial waste.

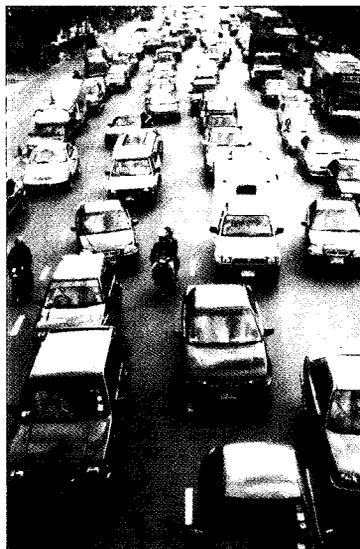
It is reported that reductions in economic activity in the aftermath of the economic crisis have led to temporary improvements in environmental quality. Ambient levels of lead (see figure), SO_x, NO_x and carbon monoxide levels have declined significantly. Nevertheless, the challenge for the Government is to sustain human welfare while simultaneously protecting the environment.

Since the early 1990s, the Government has enacted and implemented several key environmental protection measures. These include the phase-out of leaded gasoline, traffic management along important arteries, and commitments of nearly US\$500 million for sewerage schemes. Critical as they are, however, these responses have sometimes been characterized as "fire fighting" measures. Comprehensive air pollution prevention planning or sanitation and sewerage investments have been lacking. The institutional capacity of the Bangkok Metropolitan Administration for planning, monitoring, and enforcement needs significant strengthening.

Very large physical investment supported by policy corrections and institutional strengthening of the BMA are required to reverse the growing decline of environmental quality in Bangkok

Reducing Lead Level in Bangkok (1988-1997)





STRATEGY: Bangkok will continue to lead the country's economic recovery in the foreseeable future. It is imperative that this growth not come at the cost of further environmental decay, which could be an impediment to the city's long-term competitiveness in Asia. This strategy recognizes the need for immediate interventions while supporting long-term solutions.

Comprehensive Planning. Support should be provided to BMA and PCD in introducing more comprehensive approaches to planning, enforcement, and monitoring. This should build on the lessons learned from previous work of the World Bank and other donors. Opportunities for collaboration should be explored.

Selective and Phased Investments. Investments should have spatial significance and contribute to immediate health gains. World Bank support should be phased over a longer period of time through a mix of investment projects and non-lending advisory services, which target further reduction in transport related air pollution and improvements in wastewater treatment and disposal.

Polluter Pays Principle. Gradual introduction of the Polluter Pays Principle should be supported, together with eventual application of user charges for cost-recovery of operations and maintenance of waste management facilities.



PROPOSED WORLD BANK INVOLVEMENT

In support of the strategy outlined above, the BMA's Bangkok Urban Environment Program will have two World Bank financed investment projects and several analytical and advisory services. The two investment operations will be co-financed with the JBIC. The lending operations are the Bangkok Air Quality Management Project and the Bangkok Waste Management Project.

Bangkok Air Quality Management Project (US\$60-80 million). The proposed project will finance emission reductions from transport sources, road dust control, capacity building of BMA, traffic management, strengthened air quality monitoring network, and increased public awareness.

Bangkok Waste Management Project (US\$350-400 million). The proposed project will 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 in solid waste management, especially disposal.

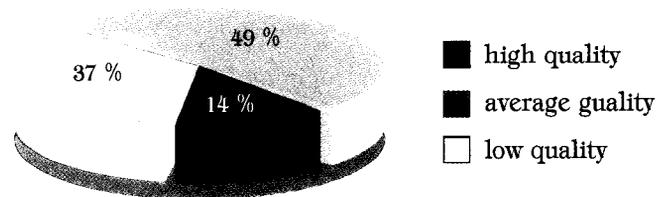
Other Assistance. Analytical and advisory service activities will be undertaken with other donors and participation of the World Bank Institute.

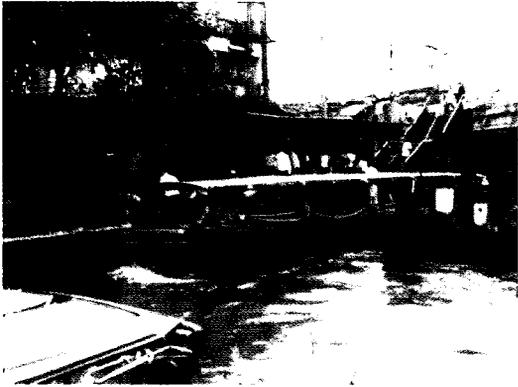
Water Management of the Chao Phraya River Basin. Current problems of water availability and quality (see figure) can be traced to poor management of water resources. An integrated spatial and ecological approach is needed to better manage river basins. Losses of forest cover and inappropriate land use practices have affected hydrology. This in turn has exacerbated topsoil erosion and sedimentation of waterways and storage structures. Increased wet season run-off and consequent downstream flooding and reduced dry season stream flows are also thought to be directly related to poor land management. Key watersheds are under pressure from illegal logging and encroachment by farmers in upland areas.

The Chao Phraya River Basin is a key watershed in the country because of its size, strategic location and economic importance. The basin covers almost one-third of the country and accounts for two-thirds of 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 of the basin are used for agriculture, and competition from industrial and domestic uses is on the rise. While deforestation and illegal logging affect the upper reaches of the Chao Phraya, its lower reaches suffer the consequences of urban and industrial pollution from the Bangkok Metropolis.

Integrated and conjunctive management of surface and groundwater in the Chao Phraya River Basin would have major economic, environmental, and social benefits.

Quality of Surface Water in Thailand
Pollution Control Department Survey in 1997





STRATEGY: Conjunctive management of surface and groundwater resources is critical to the long-term sustainability of the Chao Phraya watershed. The strategy proposes to take a fresh look at the institutional framework and instruments required for promoting and regulating more efficient water use.

Institutional Framework for Watershed Management.

Institutional mechanisms at different levels should be developed, ranging from water-user associations at the local level to river basin organizations at the basin level. Such a framework would ensure that the competing demands of water users are given adequate consideration in Government decision-making. The framework should recognize that the management of water resources is critically affected by land use decisions.

Rethinking the Role of the State. The Government should divest itself of its function as a service provider, developing instead 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.

New Instruments and Incentives. Instruments should be developed, including licensing, tradable rights and service provision charges, which induce voluntary cooperation of users to ensure 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

Natural Resources Management Project (US\$200 million). The proposed project is intended to assist with key aspects of the long-term process of water resources management reform in Thailand, focusing on the Chao Phraya River Basin. It will take a basin-wide approach, and focus on issues of watershed protection and dam safety in the upper basin, modernization of irrigation management and associated infrastructure investments, improved groundwater management, and better allocation and conflict resolution mechanisms basin-wide.

Chao Phraya Basin Organization. A fundamental focus would be on the development of a new institutional structure—the 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.



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