THE STUDY ON

ENVIRONMENTAL SECTOR PRIORITY IN THAILAND (Phase II)

SETTING PRIORITIES IN THAI ENVIRONMENTAL POLICY

Social Research Institute
Chiang Mai University

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Phase II: SETTING PRIORITIES IN THAI ENVIRONMENTAL POLICY

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Abbreviations

ADB	Asian Development Bank
AIT	Asian Institute of Technology
BBC	British Broadcasting Corporation
BOD	Biochemical Oxygen Demand
CBD	Convention on Biological Diversity
CBNRM	Community Based Natural Resource Management
CCP	Cities for Climate Protection
CERs	Certified Emission Reductions
CDM	Clean Development Mechanism
CIDA	Canadian International Development Agency
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
DEQP	Department of Environmental Quality Promotion
DNA	Designated National Authority
DANCED	Danish Cooperation for Environment and Development
DANIDA	Danish International Development Assistance
DOE	Designated Operational Entity
EIA	Environmental Impact Assessment
EMP	Environmental Quality Management Plan
EPA	Environmental Performance Assessments
ET	Emission Trading
GEF	Global Environment Facility
GDP	Gross Domestic Product
GIS	Geographical Information System
GMOs	Genetically Modified Organisms
GMS	Greater Mekong Subregion
GTZ	German Technical Cooperation
IGES	Institute for Global Environmental Strategies
ISEW	Index of Sustainable Economic Welfare
IUCN	International Union for the Conservation of Nature and Natural Resources (the World Conservation Union)
IPM	Integrated Pest Management

JI	Joint Implementation
JICA	Japan International Cooperation Agency
JoMPA	Joint Management of Protected Areas
LMOs	Living Modified Organisms
MDGS	Millennium Development Goals
MoAC	Ministry of Agriculture and Cooperatives
MoE	Ministry of Education
MoEnergy	Ministry of Energy
MoF	Ministry of Finance
MoH	Ministry of Health
MoI	Ministry of Interior
MoIndustry	Ministry of Industry
MoL	Ministry of Labour
MoNRE	Ministry of Natural Resources and Environment
MoST	Ministry of Science and Technology
MoT	Ministry of Transportation
MoTS	Ministry of Tourism and Sports
MPW	Management and Protection of Wetlands Areas
MRC	Mekong River Commission
NCC	National Coordinating Committee
NEDO	New Industrial Technology and Energy Development Organization
NESDB	National Economic and Social Development Board
NIES	National Institute for Environmental Studies
NGO	Non-Governmental Organization
NRE	Natural Resources and Environment
ODP	Ozone Depletion Potential
OECD	Organisation for Economic Co-operation and Development
ONEP	Office of Natural Resources and Environmental Policy and Planning (formerly OEPP)
PAs	Protected Areas
PAO	Provincial Administrative Organization
PCD	Pollution Control Department
PCF	Provincial Conservation Fora
PIC	Prior Informed Consent
PSR	Pressure, State and Response
REO	Regional Environment Office

SEF	Strategic Environmental Framework
SENSA	Swedish Environmental Secretariat for Asia
SIDA	Swedish International Development Agency
SME	Small and Medium-Sized Enterprise
SRI	Social Research Institute (Chiang Mai Universtiy)
TAO	Tambon Administrative Organisation
TDRI	Thailand Development Research Institute
TEI	Thailand Environment Institute
TFP	Total Factor Productivity
TI	Transparency International
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNTEP	UNDP- Thailand Environment Partnership
USAID	United States Agency for International Development
WEFCOM	Western Forest Complex
WWF	World Wildlife Fund

Executive Summary

This report is commissioned by the Japan International Cooperation Agency, Thailand Office. The objectives of the project are:

(1) to provide an informational basis for prioritization of environmental issues in preparation for the revision of the next medium term Environmental Quality Management Plan ,

(2) to recommend strategies to mainstream the natural resources and environmental agenda in Thai government policy, and

(3) to provide a basic informational foundation for Thailand-Japan Natural resources and Environmental Collaboration.

This report also aims to analyze the causes of environmental degradation in Thailand, examine the prioritization process of international cooperation agencies and outline global environment issues for which policies are still evolving.

It is widely accepted that Thailand's rapid economic development in the last several decades has put considerable stress on its environment. Although the development self assessment of the National Economic and Social Development Board indicates that Thailand is firmly on a path to prosperity, it warns about two areas of weaknesses: income distribution and environment. Environmental performance assessments from several studies confirm a general deterioration of both natural resources and environmental quality. Although Thailand saw some improvements in environmental performance following the 1997 economic crisis, particularly in critical areas where information is available, such as groundwater use and air quality, notably this was due to production and capacity declines in the manufacturing and energy sectors. As growth has resumed, increased activity again puts stress on the environment.

The analysis of environmental degradation in various sectors indicates that many environmental problems tend to be localized, involve multiple stakeholders and thus involve multiple and often conflicting objectives. Sectoral management can lead to overlapping mandates, waste

of resources and ultimately result in greater environmental problems. Devolution of environmental responsibility to local governments is instrumental in rectifying fragmented management. However, currently, local governments are still very weak and lack technical, social and financial expertise to carry out environmental management properly.

Currently, the Thai government has devoted about slightly over one percent of its national budget for environmental management to the central government agencies. The environmental budget of the Thai government has been on a decreasing trend. This is partly because environmental responsibilities have been delegated to local governments. Some of the environmental expenditures may also be included in the central budget (*Ngop Klang*) the use of which is exclusively the prerogative of the Prime Minister. Some of this central budget could be used to redress environmental problems. However, it is not possible to separate environmental expenditures in the budgets of local governments or central governments. It is worth noting, however, that more than half of the MoNRE budget goes to conservation of forests and biodiversity.

There are several ways to prioritize environmental concerns, and all have advantages and disadvantages. Most studies on prioritization rely on the expert judgment and indicators approach with the assistance of indicators, and focus on particular issues and sectors. Others used the valuation method. Citizen and expert surveys provide a valuable view of what the public is most concerned with. Local studies tend to put the forest sector at the top priority followed by water resources (drought and floods). International banking agencies appeared to place water pollution as a top priority because of the better infrastructural investment opportunities.

Thailand has been party to most international environmental treaties and conventions but official and public understanding about global environmental issues, the costs and benefits and the significance and the implications of these conventions on Thailand's future are meagre. This has very much deterred the policy formulation process and has pre-empted the realization of the benefits that the country could have reaped from multilateral cooperation. The three groups of international conventions

for which clear policies have yet to evolve are biodiversity, atmospheric protection and the control of transboundary movements of hazardous wastes. It is desirable that Thailand develop institutions and laws in compliance with its international commitments. In addition to fulfilling the institutional gaps, communication with and building capacity for the appropriate government agencies concerned, including its personnel, NGOs and civil societies and the private sector are imperative.

Global issues are thus one criterion for international agencies assistance when choosing cooperative projects. There are several other noticeable criteria. First, the foreign country tends to seek projects in which it has a comparative advantage over other countries. Second, agencies like to connect environmental concerns with other development goals, such as health, gender, poverty or consumption issues. In addition, there is a tendency to link environmental and other issues to create a forum for public participation. Furthermore, the foreign agencies look to issues with regional or national importance, and those that have clear or consistent policy targets. Finally, many agencies look to the economic impact to determine their partnerships.

Environmental cooperation in Thailand emphasizes three main substantive areas and one process-oriented area. First, conservation of biodiversity is of high priority due to Thailand's tropical ecosystems, which are abundant with varied life forms, but face extreme threat levels due to the value of the resources and ineffective law enforcement. Second, many agencies focus on urban/industrial issues due to the impacts of Thailand's rapid transformation from an agricultural to an urban lifestyle. Finally, most if not all of the international cooperation agencies are working to improve the capability of government agencies.

The study identifies five managerial gaps which could provide niches for Thailand-Japan environmental collaboration. First, the connection between central and local governments in environmental management is relatively low despite the fact that local governments are the actual environmental implementing agencies of MoNRE's various plans and regulations. There is no *de facto* extension system despite the fact

that local governments' knowledge and managerial capacity are inadequate to carry out their responsibilities, and despite the fact that MoNRE has both regional and provincial authority. Second, sectoral management has resulted in overlapping mandates and a waste of resources. Third, as a new ministry, MoNRE needs to establish a system for creating and synergizing institutional knowledge to respond to environmental problems that are continuously evolving. Fourth, communicating environmental issues with the public has been ineffective although this is probably the most important strategy to mainstream environmental issues. Finally, there is a need to close the knowledge gap on global environmental issues especially on the clean development mechanism under the Kyoto Protocol to the Climate Change Convention.

Despite the management gaps mentioned, there are a number of factors that could assist the achievement of better environmental administration. First, the Thai government is undertaking public service reform which stresses a citizen focus and an output/ outcome orientation. The reform package also makes public participation mandatory. Thus public service reform is proving a good foundation for environmental governance. Second, the country can benefit from the strength of local universities, NGOs and local civil societies. Finally, Thai ministries are preparing to become e-ministries: they will be creating electronic information and knowledge storage capacity. Thai-Japan collaboration efforts could consider including these factors in future project formulation.

Mainstreaming environmental issues can be useful to correct or reverse degradation trends. Under a populist regime, when the public makes demands for environmental improvements, then the politicians will start to be serious about environmental goals in their agenda. The strategy that would do most to mainstream environmental issues is to engage in public communication about environmental values. This means mobilizing the informed public and concerned citizens into a movement for environmental protection. Measures under this strategy would include:

- support for environmental alliances that include multiple stakeholders concerned about the environment,

- means for these alliances to collect, assemble, and analyse environmental problems in their own ecosystems,
- provision of communication channels, including fora, distant and mass media, for these alliances to operate and disseminate information to the wider public,
- strengthening existing environmental public relations activities so that the information disseminated would reach the public in a more user-friendly form, and be more relevant to their immediate interests,
- provision of opportunities for non-government entities to conduct environmental public relations as government agencies may be reluctant to reveal bad news, and
- support knowledge hub of best practices accessible to local governments, NGOs, academia, and concerned citizens.

In our opinion, the best criteria for selecting priority areas for Thailand-Japan collaboration are: (1) cross-sectoral linkage, 2) linking best practices to policy or mainstreaming environmental issues, (3) support for new environmental initiatives and strengthening institutional knowledge on global issues, (4) focusing on fragile ecosystems and environmentally distressed areas, and (5) commitment of local counterparts.

The study proposes three priority areas. These are: 1) strengthening the environmental management of local governments and the link with MoNRE, (2) hazardous wastes and pollution management, and (3) mainstreaming global environmental issues.

The Study on Environmental Sector Priority in Thailand
Phase II: Setting Priorities in Thai Environmental Policy

This is a Phase II report commissioned by the Japan International Cooperation Agency, Thailand Office. The objective of the project is to establish a process for prioritization of environmental issues in preparation for the next medium term plan. Specifically, this project aims to:

(1) provide an informational basis for prioritization of environmental issues in preparation for the revision of the next medium-term Environmental Quality Management Plan (EMP),
(2) and recommend strategies to mainstream the natural resources and environmental agenda in Thai government policy, and
(3) provide a basic informational foundation for the Thailand-Japan Natural Resources and Environmental Collaboration.

This report is separated into eight sections. The introduction gives the overview of Thailand's economic development and its interaction with the environment. In the second section, developmental and environmental assessments are considered. In the third and fourth sections, we present the causes of environmental degradation, the national environment strategy and budget allocation respectively. The fifth section examines prioritization of environmental issues and the discussion of each example in details. In the sixth section global environmental issues are discussed and in the seventh section we consider the international collaboration on environmental issues in Thailand. Finally, the last section which contains a synthesis and conclusion suggests a proposed course of environmental collaboration for Japan and Thailand.

1. Introduction

1.1 Background

Thailand has experienced relatively vigorous economic growth during the last two decades. The agricultural sector, the main driving force behind the Thai economy prior to the 1970's, has been replaced by the manufacturing sector during the 1980's, and since the 1990's, manufacturing has accounted for more than three-quarters of Thailand's export earnings. After 1987, Thailand attained double-digit real growth rates for three consecutive years and emerged as one of the world's fastest

growing economies. Although the 1997 economic crisis put a temporary brake on the manufacturing industry, that sector together with the tourism sector have continued to develop, becoming the main economic pillars of the Thai economy.

The key to Thailand's early economic success was the reliance on the extraction of natural resources. Despite the fact that agriculture now accounts for about only 10 percent of the GDP, about 40 percent of the work force still relies on the agricultural sector for their livelihood. Providing land to support these livelihoods has been one of the central problems for all Thai governments during the last fifty years. The problem has been reinforced by the adoption of a cash-crop economy, which has caused continuing encroachment into protected forests and public land.

In addition to land resource problems, Thailand is encountering increasing water shortages during the dry season. Water conflicts have arisen frequently during the last two decades due to competing water uses among the various economic sectors. Thailand lacks a coherent policy, relevant laws or regulations for the provision of equitable and efficient water use.

Modern industrial expansion, which started in the 1960s, added new pressure to the environment, first through solid wastes, water and air pollution, followed by expanding hazardous waste production. Growth in the transport sector during the last four decades has also been a major cause of air and water pollution.

Population increases have put more pressure on the environment. Rampant urbanization has aggravated water and air pollution, as infrastructure has not kept pace with the increase in urban population growth. The increase in personal income has stimulated demand for new consumer goods such as cars, electrical appliances, computers, and mobile phones. These modern devices require special waste management, putting greater burdens on inexperienced local governments that are already unable to cope with solid wastes management problems. Like other countries, economic growth and industrial development in Thailand have been achieved at the cost of deterioration to natural resources and the environment (NRE).

Over the past 5 decades, Thailand has developed policies and laws to deal with these natural resources and environmental management problems. A number of forest laws were introduced in the 1960's based on conservation and control of resource uses. Over the years, the Thai government has also adopted several policies, mostly in the form of Cabinet resolutions, to deal with problems of people living within the

state-defined forest boundaries. All these laws and policies have not been effective in stopping or slowing deterioration of natural resources and the environment. The report in phase 1 listed more than 60 NRE problems in need of solutions.

Sectoral management is perceived to be a substantial obstacle to effective environmental management and sustainable development. Management of natural resources is categorized by resource, such as forests, soil and water, without sufficient coordination or integrated planning. The picture is further complicated by the decentralization action plan which prescribes the transfer of certain environmental management functions to local governments.

Decentralization raises a level of confusion as to the extent of power transfer, and fails to clarify who bears ultimate responsibility whenever there are management problems. Environmental policies that focus mainly on individual resources have so far failed to provide lasting solutions for the environment, or the problems of poverty, and still do not ensure a sound basis for the country's competitiveness.

The current government of Prime Minister Thaksin Shinawatra is one of the most proactive governments in recent Thai history. Public service reform is a high priority, as seen by the issuance of visions and goals. Among the long term visions issued during the previous administration (2001-2004) is to increase Thailand's role in international trade and the international political arena. Two of these proposals are at the forefront of these efforts.

Kitchen of the World is a vision which seeks to expand Thailand's agricultural sector by increasing export of high-value-added agricultural products. This is certainly one of the visions that require a sound natural resources policy. Further, the ***Detroit of Asia*** concept seeks to place Thailand at the top of Asia's automobile manufacturing sector, and is another vision that would further burden the currently weak management of industrial wastes

In his inauguration speech to the Thai Parliament in March, 2005, Prime Minister Thaksin Shinnawatra reiterated that poverty elimination is a primary national goal. This doctrine requires re-examination of the country's natural resources policies. In the latest National Administration Plan (*Phan Borihan Ratchakan Phaendin*), management issues listed as vital for boosting the economy include issues related to water and land provision, both of which are linked to increasing production and income, with lower priority for concomitant environmental impacts.

Strategies and plans at the provincial level also reflect the national emphasis on economic growth, stressing income generation, with less emphasis on or even neglect of environment issues. There are plans for development-oriented mega projects and the creation of infrastructure in national parks for tourism purposes. Despite the fact that past and present environmental problems are still unresolved, new environmental threats continue to arise. The emphasis on income generation, with lower priority for solving NRE issues both at the national and local levels, has caused concerns among scientists, civil society organizations and environmentalists. Strategies to mainstream environmental issues are a necessary condition for resolving Thailand's continuing NRE dilemmas.

Currently, the Ministry of Natural Resources and Environment is preparing a new medium-term NRE Plan for 2007 - 2011. It is also mandatory under the public service reform strategy for the Ministry to set up a public participation process, in which information and knowledge from all stakeholders is assembled, shared, considered, prioritized, and placed into the pipeline for future NRE management.

1.2 Framework and Methodology

1.2.1 Analytical Framework

The pressure, state and response framework (Figure 1.1) will be used to explain the interconnections between various pressures and actors, as well as the likely impacts and current policy responses. *Causal maps* will be produced for these issues, linking economic and social activities with NRE polices. Figure 1.1 provides the general framework, which will be used to analyze the causes and the effects of human activities on the environment.

The main advantage of the PSR framework is that it includes important stakeholders, and thus the model can claim to be holistic. As environmental impacts are usually man-made, the framework allows for the investigation of causes, impacts and responses (or lack thereof). Under each category (pressure, state and response), indicators are compiled to reflect the nature and the extent of the pressure, the resultant status of the environment, and the response by authorities.

Examples of pressure indicators include (P1) the change in the area of shrimp farming, (P2) consumption of timber and wood products, (P3) expansion of second and third rice crops in the dry season, or (P4) increase in the number of registered vehicles, etc. Status indictors may include

(S1) total forest areas in total land areas, (S2) mineral reserves, or (S3) number of days that pollution is above acceptable standards. The response indicators typically involve actions taken by the government, such as (R1) proclaimed protected areas or (R2) percentage of collected and treated solid wastes. Often response indicators merely measure administrative processes such as (R3) the promulgation of a new forest law, (R4) the establishment of river basin organizations or (R5) the number of town plans completed.

When appropriately chosen, these indicators could increase understanding of the problems. The PSR process, and its associated indicators, represent the most popular model used in the evaluation of environmental policy and impact in many studies in Thailand.

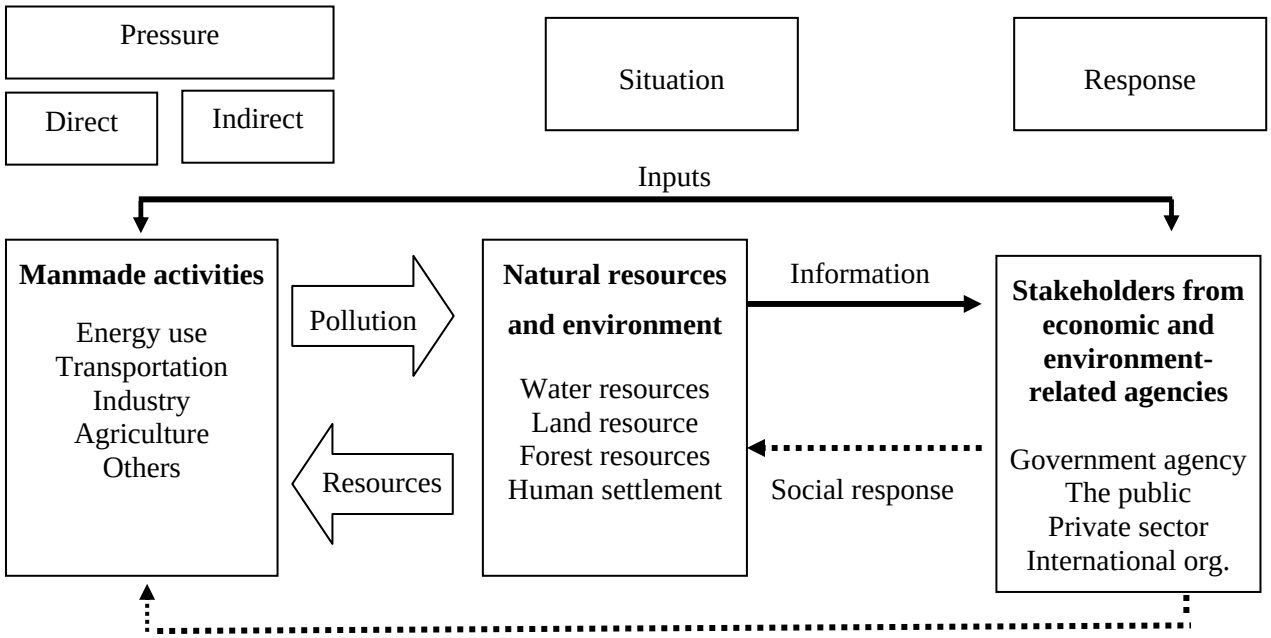
Although the PSR model is useful for qualitative discussion of causes of environmental impacts, the use of indicators means that the model is dependent on the availability of the data involved. This could cause a bias in the assessment of the overall ecological system if a certain environmental sector lacks supporting statistical data. In the case of Thailand, the marine sector seems to suffer from this type of weakness more than the forest sector.

Moreover, process indicators only suggest that the *process* is ongoing but it tells nothing about the *effectiveness* of that process. As a result, a shrewd bureaucrat could select a set of indicators that really makes the response to problems look more effective than it really is.

1.2.2 Review of donors' activities in the environmental sector, and their priorities.

Interviews with major funding agencies in the environment field such as DANIDA, SIDA, UNDP and so on have been conducted. Their activities and methods of prioritization will be compared in section 7 of this report.

Figure 1.1 Pressure - State – Response Framework



Source: OECD (1994) cited in Segnestam (2002).

1.2.3 Prioritization of Key Environmental issues

Among the several approaches used for prioritization, the indicator approach is the most common. It is often used with the aid of indicators under the PSR model cited above. The indicator approach is useful to reveal the extent of pressure or the severity of damage to allow the provision of resources to deal with the problem. However, the indicator approach does not allow comparisons across sectors. For example, we cannot compare the severity of soil salinity in Isaan (Northeastern part of Thailand) with the loss of coastal mangroves.

In order to compare across sectors, economic valuation is one possible mechanism. In this situation, economic values must be placed on damage or losses. Economic valuation of the environment is a relatively new field of economics. To date a number of methods have been described (Emerton and Bros 2004). One such method, contingent valuation, could be used to estimate the values of environmental goods and services that have no markets.

In Thailand, there are a number of valuation studies that could be used to give some ideas about environmental losses and damage (Mingsarn

et al. 1996, Suthawan et al. 1999). These studies could be used as blueprints to evaluate natural resources and environmental losses by sector.

Prioritization is normally conducted in accordance with set visions or goals. However some goals, such as sustainable development, may have objectives that include economic, social and ecological issues. As will be seen later, several studies have attempted to aggregate these different indicators to obtain a single sustainability indicator.

This procedure is not recommended because it introduces external bias, e.g. who should pick the indicators, what indicators to choose, what weight should be used in the aggregation process. For example, should the indicator for deforestation be given higher weight than that for land subsidence in Bangkok? Expert judgments have been used to rank indicators or to aggregate indicators, but economic valuation overcomes the weighting problem by using prices or the monetary value of the environment as the weight.

In this study both valuation and indicator approach are used to help prioritize environmental problems.

In Section 5 information will be drawn from various studies that have put values on forests, biodiversity and from several focus group meetings held to assess opinions of leading experts, practitioners and environmentalists with regard to the concepts and methods of prioritization, as well as the causes and effects of environmental degradation.

However, it must be noted that the final weights of these three objectives are usually decided by politicians. They can base their decisions on constituent response, negotiation or polls. What is important is that this will ultimately be a political outcome. Academics and consultants can only consider benefits and detriments from different perspectives.

1.2.4 Selecting a priority area for the collaboration program

Priority issues for the areas will be identified for future Thai–Japan collaboration efforts and criteria for selecting these priority areas for collaboration projects will be proposed in the final section of this study. It is possible that high priority or highly urgent issues may not be recommended for a collaboration project because they do not fit the selection criteria (e.g. past administrative ability and achievements, current level of domestic and international support, cross departmental interconnection and so on).

2. Development and Environmental Performance Assessment

The following section provides an assessment of the economic and social development of Thailand as viewed by various agencies. These assessments reflect the popular use of the indicator approach. The choice of indicators selected by these agencies is noteworthy as they show the emphasis given to each resource sector.

2.1 Development Assessment by NESDB

Thailand is generally known as a forward-moving medium-income country. Following the economic crash in 1997, the country has recovered and is moving ahead again. After coming into office as Prime Minister in 2001, Dr. Thaksin Shinawatra announced a dual-track development doctrine which stresses improved competitiveness with an increased globalization link in addition to the promotion of grassroots economies.

Two years later, the National Economic and Social Development Board (NESDB) evaluated the economic and social performance of Thailand and computed the Economic Strength and the Level of Development index. The index, which was published for the first time in 2003, includes indicators related to the economic self reliance, economic immunity, timely adjustment to global changes, stability of growth and the equitable distribution of development (NESDB 2003). Details of the indicators are shown in Table 2.1. NESDB concluded that Thailand has been able to increase her economic strength and immunity to global disturbance, but cautioned that there were still several areas of weaknesses, such as high import content, and inadequate investment in Research and Development.

Although the poor population of 8.17 million in 2002 fell below the projection of the Ninth Plan (2002-2006) of 12 million, unequal distribution of income can contribute to economic and social fragility. Also, environmental indicators were not included as part of the index.

2.2 Sustainability of Thailand's Development

Following the UN Conference on Environment and Development (UNCED), Thailand has adopted the UN's Agenda 21 as a sustainable development framework. Thailand has also adopted the King's 'Sufficiency Economy' as the guiding principle for sustainable development (NESDB

2005). This requires the maintenance of balanced development in three dimensions: economic, social and environmental.

The environmental dimension includes a strong emphasis on natural resources. "Sustainable development gives a high priority to the value of natural resources by utilizing them at the level that can be recovered as much as possible to the original state. The options are to increase the productivity of resource and environmental use, the slow down in the use and the rehabilitation and replenishment of natural resources and the environment as appropriate." (NESDB 2005, pp 7-1)

Table 2.1 Index of Economic Strength and the Level of Development

Indicators	Development Index (%)					Level of development				
	Before crisis 1992-1996	During crisis 1997-1998	After crisis 1999-2000	2001	2002	Before crisis 1992-1996	During crisis 1997-1998	After crisis 1999-2000	2001	2002
Economic Self-reliance	**68.0**	**72.9**	**73.5**	**67.6**	**68.3**	**2.80**	**3.29**	**3.35**	**2.76**	**2.83**
Economic Immunity	**83.1**	**62.8**	**61.2**	**62.1**	**67.9**	**4.31**	**2.28**	**2.12**	**2.21**	**2.79**
Adaptability to the Global Changes	**65.9**	**60.3**	**65.1**	**65.7**	**67.4**	**2.59**	**2.03**	**2.51**	**2.57**	**2.74**
Stability Growth	**69.8**	**69.5**	**85.6**	**80.2**	**83.9**	**2.98**	**2.95**	**4.56**	**4.02**	**4.39**
Development Decentralization	**60.8**	**68.8**	**62.7**	**69.0**	**68.0**	**2.08**	**2.88**	**2.27**	**2.90**	**2.80**
Overall Economic Strength	**69.5**	**66.9**	**69.6**	**68.9**	**71.1**	**2.95**	**2.69**	**2.96**	**2.89**	**3.11**

Notes: For level of development:

Level 5 = Best Point	Score between 90.0 – 100
Level 4 = Better Point	Score between 80.0 – 89.9
Level 3 = Good or No change	Score between 70.0 – 79.9
Level 2 or less = Must be improved	Score less than 70.0

Source: Adapted from the Office of National Economic and Social Development Board (2003)

In order to comply with Agenda 21, in 2003 NESDB commissioned the Thai Environment Institute and Kenan Institute of Asia to determine appropriate sustainable development indicators to monitor development outcome in four subject areas: the quality of life, stability and adaptability, equitable decentralization of development, and good governance. Information concerning a total of 23 indicators was assembled, in three dimensions: economic (9 indicators), social (7 indicators) and environmental (7 indicators).

The criteria for selecting these indicators are 1) relevance to sustainable development, 2) representativeness of the overall situation, 3) ease of understanding, 4) measurability and availability of data and 5) need to avoid too many indicators. Each indicator is derived by comparing the development achievements with the set targets.

The results are presented both as percentage and as the level of achievement shown in Table 2.2 and Figure 2.1 and 2.2. Table 2.3 provides the environment indicators used in the calculation of the sustainable development index. The details of the calculating criteria for the indicator are attached in Annex I.

Table 2.2 Thailand Sustainable Development Index

Index (dimension)	Index (%)					Level of development				
	The 8th National Plan			The 9th National Plan		The 8th National Plan			The 9th National Plan	
	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
Economic	70.2	69.8	66.7	76.4	79.1	3.02	2.98	2.67	3.64	3.91
Social	61.9	61.1	62.5	62.8	65.4	2.19	2.11	2.25	2.28	2.54
Environmental	40.8	39.1	44.3	48.6	48.6	0.82	0.78	0.89	0.97	0.97
SD composite Index	57.7	56.7	57.8	62.6	64.3	1.77	1.67	1.78	2.26	2.43

Notes: For level of development:

Level 5 = Best Point	Score between 90.0 – 100
Level 4 = Better Point	Score between 80.0 – 89.9
Level 3 = Good or No change	Score between 70.0 – 79.9
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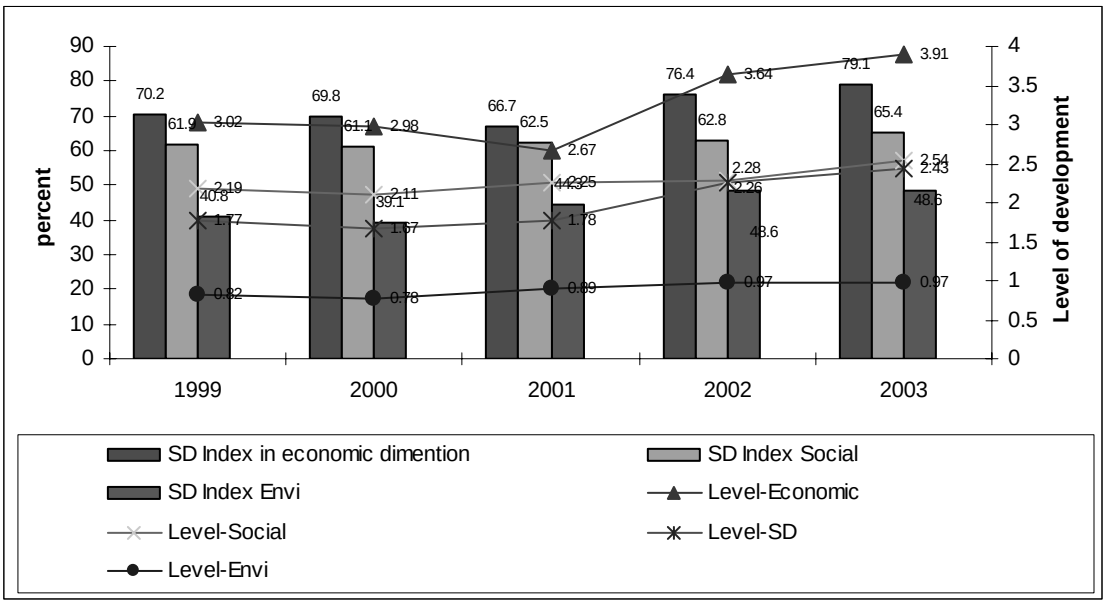
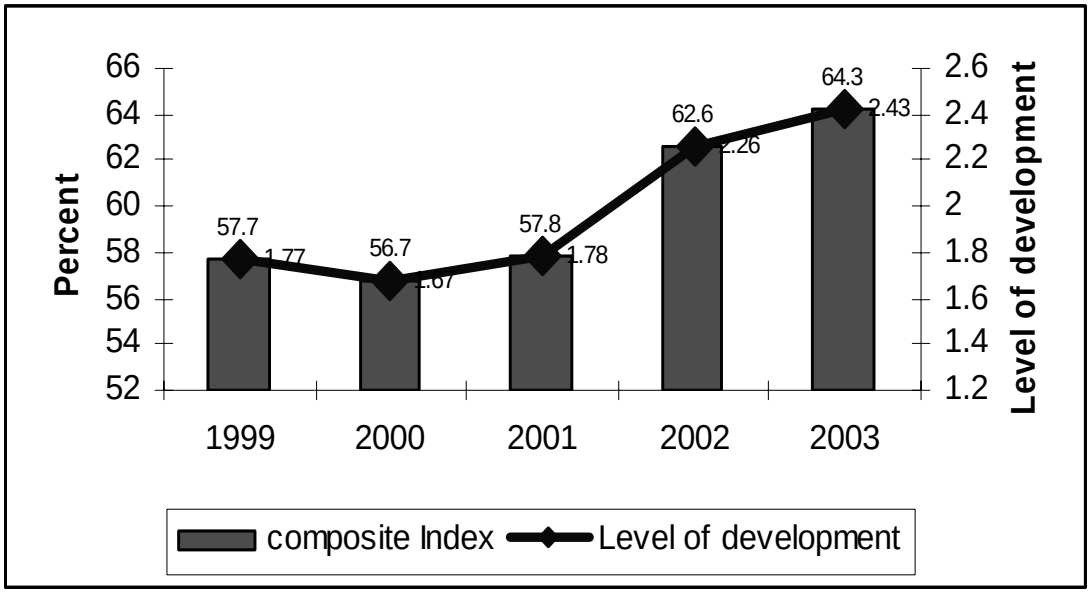
Source: The Office of National Economic and Social Development Board (2004)

Figure 2.1 Sustainable Development Index in 3 Dimensions



Source: The Office of National Economic and Social Development Board (2004)

Figure 2.2 Sustainable Development Composite Index (1999- 2003)



Source: The Office of National Economic and Social Development Board (2004)

Table 2.3 Sustainable Development Index of Thailand: Environmental Dimension

	Index (%)					Level of Development				
	8th NESD Plan			9th NESD Plan		8th NESD Plan			9th NESD Plan	
	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
Environmental Dimension	**40.85**	**39.14**	**44.33**	**48.57**	**48.57**	**0.82**	**0.78**	**0.89**	**0.97**	**0.97**
Preservation	**53.05**	**53.20**	**59.20**	**61.20**	**61.20**	**1.31**	**1.32**	**1.92**	**2.12**	**2.12**
(1) Forest area/ Desired Forest area	63.20	63.20	63.20	63.20	63.20	2.32	2.32	2.32	2.32	2.32
(2) Mangrove area/ Desired Forest area	56.92	56.92	56.92	56.92	56.92	1.69	1.69	1.69	1.69	1.69
(3) Fishing Capacity Utilized	40.10	32.00	42.70	42.70	42.70	0.80	0.64	0.85	0.85	0.85
(4) Groundwater use/ Total availability	52.00	60.67	74.00	82.00	82.00	1.20	2.07	3.40	4.20	4.20
Good Environmental Condition	**24.57**	**20.40**	**24.49**	**31.71**	**31.71**	**0.49**	**0.41**	**0.49**	**0.63**	**0.49**
(1) Good quality water resource/ Total water resource	25.00	18.00	18.00	40.00	40.00	0.50	0.36	0.36	0.80	0.50
(2) Air quality that is above standards in main cities	18.18	9.09	28.00	28.00	28.00	0.36	0.18	0.56	0.56	0.36
(3) Properly treated hazardous wastes	30.52	34.10	27.48	27.14	27.14	0.61	0.68	0.55	0.54	0.61

Notes: For level of development:

Level 5 = Excellent	Score between 90.0 – 100
Level 4 = Very Good	Score between 80.0 – 89.9
Level 3 = Good	Score between 70.0 – 79.9
Level 2 or less = Need Improvement	Score less than 70.0

Source: National Economic and Social Development Board (2004)

While preparing for the tenth Economic and Social Development Plan in July 2005, the NESDB again re-evaluated Thailand‘s development performance, with similar results. NESDB concluded that

> “The Thai economy was getting stronger with stable and high growth rates and it has built up immunity from external shocks owing to improved fiscal balance. The country has had improved capacity in adjusting to external changes but inequitable income distribution

> remained a factor limiting the process of sustainable development" (NESDB 2005, pp 2-3)."

In this evaluation report, the Sustainable Development Indicator cited above was reported again, but this time the evaluation report took a more critical stand towards the environmental dimension.

2.3 Thailand and the UN Millennium Development Goals (MDGs)

Apart from UNCED sustainable development goal, Thailand is one out of the 189 countries that subscribed to the United Nations Millennium Development Goals (MDGs) in September 2000. Ensuring environmental sustainability is goal number 7 of the 8 MDGs. As Thailand was able to achieve the target of combating poverty, hunger, gender, HIV/AIDS, and Malaria fifteen years before the schedule, it has committed itself to a bigger challenge called MDG Plus, i.e. more ambitious targets. Table 2.1.4 presents environmental goals of the MDG, other MDG Plus and their indicators. Despite Thailand's achievements in combating poverty, hunger, and HIV/AIDS, Thailand Millennium Development Report 2004 acknowledged that environmental sustainability remained Thailand's greatest challenge.

Table 2.4 shows the indicators for the MDGs. It is clear from the statistics that it cannot be concluded that Thailand's environmental trend is improving.

> "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 the private and public sector companies have 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 form 1996 levels, thus affecting pollution control and natural resources conservation programs" (World Bank 2002).

Table 2.4 Thailand's MDG indicators for Sustainable Development Goals

Indicators	1990	1995	2000	2002
Proportion of land areas covered by forest (%)	28	25.6	25.3 (1998)	33 (2000)
Ratio of areas protected to maintain biological diversity to surface areas (%)	12.4	15	17.6	n.a.
Energy use per 1,000 Baht* GDP at 1998 price (kg of oil equivalent)**	15.7	15.5	15.7	15.9
Carbon dioxide emission (metric tons per capital)	2.4	3.6	2.3	n.a.
Consumption of ozone-depleting CFCs (ODP tons)	7,262	8,314	3,586	n.a.
Proportion of population using solid fuel (i.e., fuel wood, charcoal) (%)	65.5	47.2	36.3	30.5

Notes: * = Baht 1,000 was equivalent to approximately US$ 40 before 1997 and US$25 in 2003.
** = All MDG indicators are confirmed except for the energy efficiency measure which is expressed in 1,000 Baht at 1988 price.
Sources: Thailand Millennium Development Goals Report, 2004, for the year 2002 the data are updated by SRI

2.4 Evaluation by Academia

A more critical evaluation of Thailand's development arose in the annual academic seminar at the Faculty of Economics, Thammasat University on the 14th and 15th June, 2005. One critique of the "dual-track" approach[1] admitted the successes of short-term stimulation from "Thaksinomic" policies. However, the increased risks of populist policy and extra budgetary spending outside the purview of the Parliament was severely admonished (Apichart and Duangmani 2005). The authors see the dual-track approach as a stimulant for capitalism rather than a panacea for development.

Nipon Paopongsakorn also voiced concerns over increased government interventions in markets (e.g. diesel prices, agricultural subsidies, reduced toll way fees, etc.). Concern was also voiced over the long-term social and political impacts from the current executive

[1] The dual track approach refers to Prime Minister Thaksin's approach to economic development of both benefiting from globalization and strengthening the grass roots and economic self-reliance.

administration. However, environmental issues were not among the mainstream discussion.

It is apparent that under this current political regime, economic issues are regularly given higher priority. There are also some social issues that the government has used to attract special attention from the public such as corruption and narcotics. Environmental issues are always included under the umbrella of "sustainable development" in all important official documents both in terms of looking at the impact and as a strategy. However, environmental issues seem to be relegated to the purview of bureaucrats being included in the national strategy and plans, rather than being a political agenda; these issues have not yet been given a prominent position in the political or policy mainstream.

2.5 Trade and Environment

The most recent study on the impact of trade on Thailand's environment is very critical of Thailand's development success which has been largely export oriented (Mukhopadhyay 2005). It reveals that the expansion of trade and investment has not benefited Thailand environmentally. As Thailand's trade structure shifted from agriculture to manufacturing exports, its pollution terms of trade have also increased especially for CO_2 emission (Table 2.5). This means that pollution embodied in Thailand's exports has gradually exceeded the level of pollution embodied in imports. This further implies that the Thai industries have become a pollution haven. As Thailand continues to export electrical and electronic appliances under the forthcoming extended producers' liability regime being implemented in the European Union, management of industrial waste is likely to become a priority environmental issue.

Table 2.5 Pollution terms of trade of Thailand with OECD for CO_2, SO_2 and NO_x emission during 1980 to 2000.

Emission	CO_2			SO_2			NO_x		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Pollution embodied in export (KtC, KtS, KtNOx)	4120.11	2711.49	8579.35	41.55	26.14	83.11	9.13	11.76	35.47
Pollution embodied in import (KtC, KtS, KtNOx)	8433.57	3014.48	5573.9	82.79	27.29	50.72	19.58	19.87	35.34
Pollution terms of trade	0.4885	0.8994	1.5392	0.518	0.95786	1.6384	0.4664	0.5917	1.003
Pollution terms of trade*100	48.85	89.94	153.92	50.18	95.78	163.84	46.64	59.17	100.39

Source : Mukhopadhyay, 2005

2.6 Environmental Performance Assessment

Several agencies have conducted environmental performance assessments for Thailand. Each year, ONEP monitors the environmental status of Thailand. The NESDB monitors environmental trends for its mid-term and five-year review. The World Bank provides yearly environmental monitoring which was a biodiversity survey for Thailand last year. The strategic environmental framework project (Phase II) funded by the Asian Development Bank initiated environmental performance assessments as a capacity building program for the Greater Mekong sub-region.

In 2004 the NESDB commissioned Panya Consultants Co, Ltd. to establish and measure indicators to monitor environmental trends, in an attempt to set up an information system for natural resources and environmental planning. Three sets of indicators were established: an aggregate indicator for both natural resources and environment, and a separate index each for natural resources and environment. Each umbrella indicator consists of six indices, and are the weighted judgments of experts who are the members of project steering committee. The twelve underlying indices are related to (1) *proclaimed* protected areas, (2) soil rehabilitation, (3) surface water per head, (4) mangrove areas, (5) catch per unit effort, (6) share of natural resources and environmental budget, (7) proportion of

water sources of acceptable quality vs. proportion of water sources of very low quality, (8) proportion of treated wastewater in municipalities, (9) reuse or recycling of solid wastes, (10) the proportion of treated industrial hazardous wastes, (11) air quality and (12) the number of *protected* areas and cultural heritage sites.

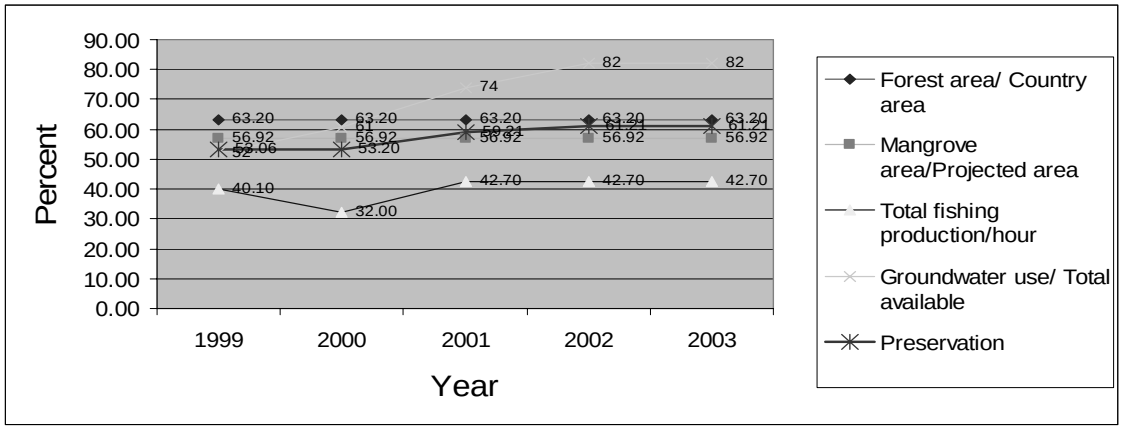
The study concluded that the trend of the indicators showed improvement, although the indicators themselves were below targets (Panya Consultants 2005). It should be noted that the choice of indices and the weights used are controversial, and at best, the trends only indicate greater efforts "proclaimed" by the government without any confirmation of the status in the field. For example, the "protection of forests" indicator is a count of proclaimed national parks, wildlife preserves, etc. There is no reduction of this index for actual measured loss of forest areas by the Royal Forest Department. Further, data on solid and hazardous wastes are merely estimates.

When NESDB attempted again to establish a sustainable development index, the environment dimension was included. The indicators used for environmental assessment are given in Table 2.3. It should be noted that the upward trends (that is, the improvements suggested by the aggregate indicator) was an artifact of the influence of the groundwater use indicator (Figure 2.3) and unusual slight upward swings of the quality of water resources and air quality.

Also worth noting is that groundwater accounts for only 6 percent of the total urban water supply and is a very tiny fraction of the total renewable withdrawal of water. This reflects the source of bias from the choice of indicators and the method of aggregation. An arithmetic mean gives an equal weight to all indicators irrespective of their actual importance. So it is possible, if not likely, that one indicator can dominate others and give false assurances on trends.

Despite the upward trends, the study concluded that natural resources in Thailand have been wasted, leading to conflicts between conservation and extractive uses. Thailand's achievement is unbalanced, because although the economy was expanding at an acceptable rate, the development is unsustainable (TEI and Kenan, 2004, p 9). The conclusion in this section of the TEI and Kenan study was more cautious than the conclusion in the executive summary mentioned earlier.

Figure 2.3 Influence of groundwater indicator



Source: Data from Table 2.3

In its Ninth-Plan Monitoring Report released in July, 2005, the NESDB provided an assessment of environmental performance (NESDB 2005). It listed the following environmental trends:

- Continued deforestation, and annual reforestation has not kept up with the annual loss,
- Reduced biodiversity in both quantity and species,
- Lack of knowledge of GMOs and clarity on GMO policy,
- Increased severity of water shortages,
- Continued land degradation and inappropriate land use,
- Deterioration of marine and fisheries resources
- Energy use and consequent pollution have been on an increasing trend,
- Increased urban solid waste and weak capacity of local governments to deal with it,
- Quality of water from major sources are below standards required for use,
- Continued air quality deterioration in major cities,
- Increased amount of hazardous wastes and inability to cope with the problem, and
- Increased import of hazardous substances for use in agriculture and manufacturing industries.

This list only confirms our findings for Phase I which provided a comprehensive overview of environmental performance in Thailand.

A recent assessment of environmental policies and plans conducted by TDRI (2005) using the indicator approach concluded that there were some improvements in areas such as protection of natural and cultural areas, environmental technology and soil rehabilitation mainly from response

indicators but there is inconclusive evidence in big areas such as forest resources, land use, water, and minerals. For pollution management, the indicators show that the situation is diverging from the targets.

2.7 Conclusion

It is widely accepted that Thailand's rapid economic development in the last several decades has put considerable stress on its environment. Although the development self assessment of the National Economic and Social Development Board indicates that Thailand is firmly on a path to prosperity, it warns about two areas of weaknesses: income distribution and environment. Environmental performance assessments from several studies confirm a general deterioration of both natural resources and environmental quality. Although Thailand saw some improvements in environmental performance following the 1997 economic crisis, particularly in critical areas where information is available, such as groundwater use and air quality, notably this was due to production and capacity declines in the manufacturing and energy sectors. As growth has resumed, increased activity again puts stress on the environment.

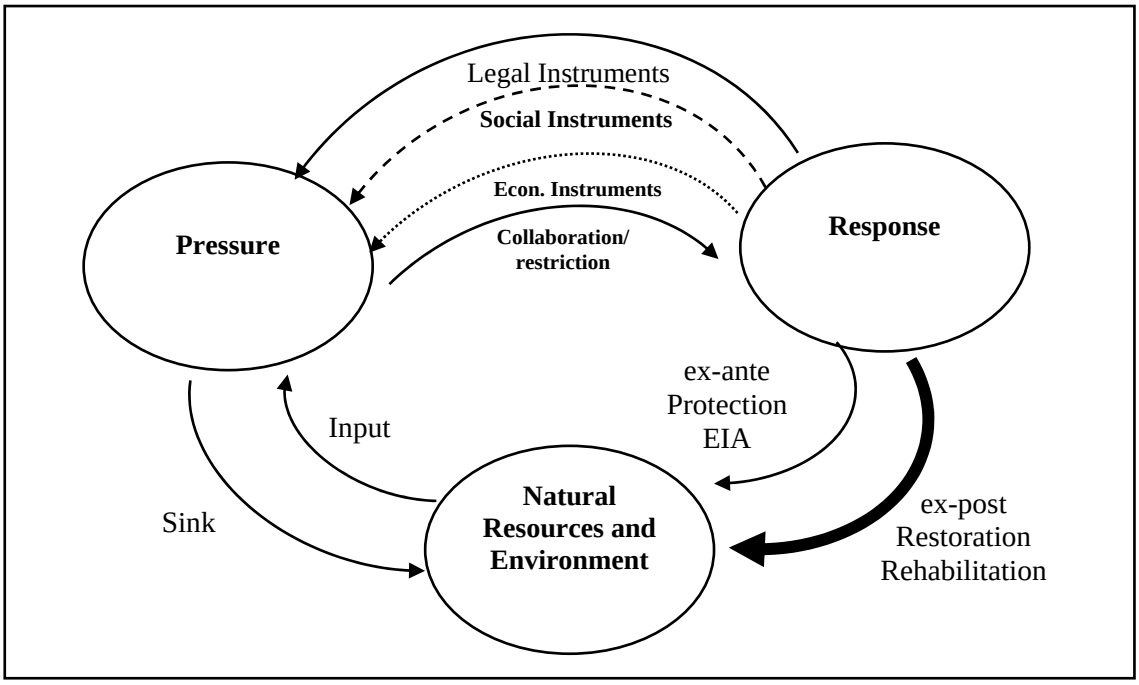
3. Causes of Environmental Degradation

The structure of environmental problems can be investigated through questions pertaining to the PSR model stated earlier (Figure 1.1). Where are the pressures on the environment coming from? What are the impacts? Who are the winners and losers? What are the responses of the government and stakeholders? Figure 3.1 depicts the causal relationship between sources of pressure on the environment and the responses to these pressures. Most pressures on the environment are from man-made activities that extract resources from nature and use the environment as a waste and pollution sink.

The policy response in Thailand is not atypical of most other developing countries, i.e. mostly *ex-post facto* involving rehabilitation and restoration of the environment, often after severe damage. *Ex-ante* or precautionary measures are rare, despite the fact that they are stated explicitly in the mission of MoNRE. Environmental Impact Assessment (EIA) is by far the only important precautionary measure but it is hardly effective. Megaprojects (such as the new national Survannabhumi Airport) are often approved before the EIA report is completed.

Among the three types of government response, legal instruments are the most commonly used. The results of these efforts are generally ineffective as seen by the continued deterioration of the environment.

Figure 3.1 Causal relationship between the sources of the pressure on the environment and the responses to these pressures



Social instruments initiated by government agencies in the last 5 years are mostly in the form of public campaigns and awareness-raising seminars through the mass media, the effectiveness of which is difficult to evaluate. Moreover critiques have charged that government campaigns overemphasize highland watershed protection, and therefore subject mountain dwellers to a poor public image, while neglecting to point out water conservation messages that should be delivered to lowlanders and urban dwellers.

Economic instruments have been sparingly used. Contrary to popular understanding, economic instruments are not new for Thailand. Forest concessions and royalties were used for almost 75 years until the logging ban in 1989. The Department of Mineral Resources has used different economic instruments, such as mineral concessions, groundwater charges, and surety deposit to provide for restoration of a mining site. For local governments, the tax on swallow's nests has been the most well-known. Table 3.1 provides a summary of economic instruments used in Thailand.

Voluntary initiatives by communities to manage and protect the environment are many centuries old, as manifested in People's Irrigation in Northern Thailand, and the many success stories of community forests. The government has responded rather positively to these initiatives. For example, the Royal Forest Department has adopted community forests as one of its policies, so long as these forests are outside protected areas.

The Royal Irrigation Department has also joined a number of People's Irrigation canals into its system. People's Irrigation was also legalized, although the right to exclude non-members is not explicitly given. Of course there are also examples of mismanagement where new irrigation systems are superimposed on old systems, destroying social bonds and sometimes water distribution efficiency.

Interestingly, there is considerable resistance to government approach to NRE management, found in conservationists' efforts to protect ecosystems from mega projects related to energy such as dams, gas pipelines, and wastewater treatment plants. These protests have highlighted the need to improve the quality and the effectiveness of EIA, including public participation, and to ensure that mitigation measures are implemented before the project begins. Table 3.2 summarizes protests related to the environment.

Table 3.1 Selected Economic Instruments for Natural Resources and Environmental Management in Thailand

	Economic Instruments	Laws	Responsible Agency
Natural Resources			
Swallow's nests	Concession	Swallow's Nests Tax Act 1997	Local Governments, National Park, Wildlife and Plant Conservation Dept.
Mineral	Concession	Mineral State Royalty Act 1966	Dept. of Primary Industries and Mines
	Admission fee	Mineral Act 1967	
Petroleum	Concession	Petroleum Act 1971	Dept. of Mineral Fuels
Groundwater	Admission	Groundwater Act 1977	Dept. of Groundwater Resources
Forest	Concession	Forest Act 1942	The Royal Forest Dept.
	Permit	Reserved Forest Act 1964	
Fishery	Permit	Fishery Act 1947	Dept. of Fisheries
Historical parks and national museums	Admission fee	Act on Ancient Monuments, Antiques, Objects of Art and National Museums 1992	The Fine Arts Dept.
National parks	Admission fee	National Park Act 1961	National Park, Wildlife and Plant Conservation Dept.
Environment: Pollution			
Industrial Pollution			
Toxic substances	Difference in excise tax between new battery and used battery	Excise Tax Act 1984	Excise Dept.
	Difference in price for new battery, in return for used battery	Excise Tax Act 1984	Excise Dept.
Water pollution	Tax reduction for pollution treatment equipment	Investment Promotion Act 1977	The Customs Dept.
	Privileges for those locating factories in specific areas	Investment Promotion Act 1977	The Board of Investment of Thailand
	Water treatment fee	Industrial Works Act 1992	Dept. of Industrial Works
	Loan from the environment fund for improving a factory's condition	National Environmental Quality and Conservation Promotion Act 1992	The Office of Environment Fund
Community Pollution			
Water pollution	Water pollution treatment	National Environmental Quality and Conservation Promotion Act 1992	Local Governments Pollution Control Dept. Wastewater Management Authority

Source: Thailand Environmental Report 2004

Table 3.2 Social Conflicts

Source of Problems	Year	
	2003	**2004**
Infrastructure		
Dams	7	13
Electricity Utilities	41	45
Gas pipelines	79	46
Solid wastes	24	35
Wastewater treatment	3	-
Nuclear facilities	4	-
Toll way	-	15
Rock explosions	15	7
Mining	20	19
Sand extraction	5	6
Manufacturing	92	107
Agriculture	15	10
Communities	72	90
Others	63	66
All	**440**	**439**

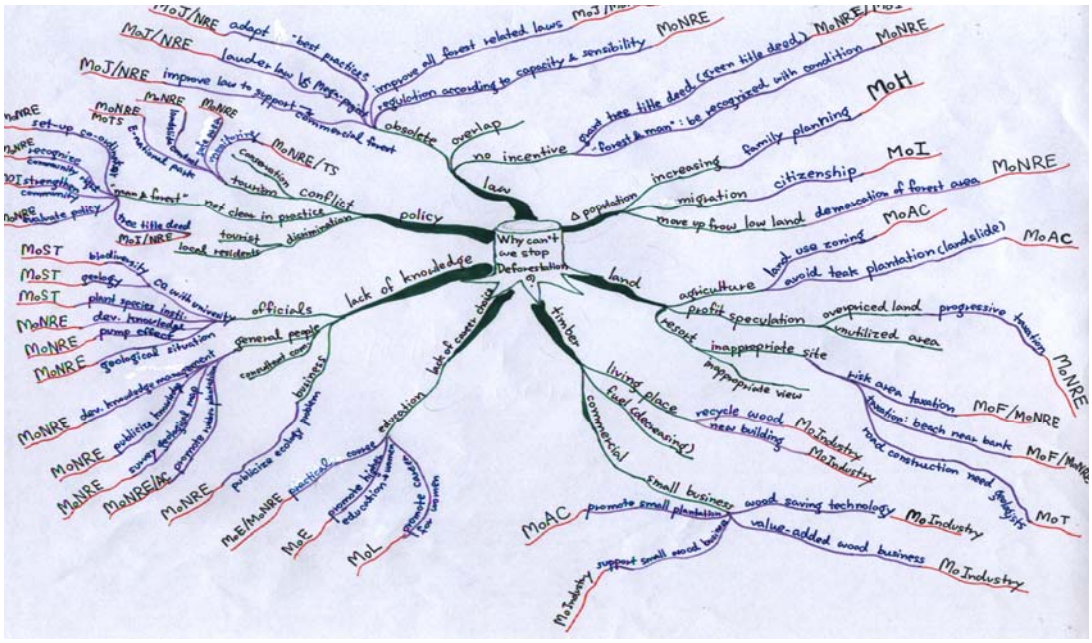
Source: National Intelligence Agency

Environmental degradation causation can also be investigated by issue. The deforestation mind map in Figure 3.2 presents the causes of deforestation in Thailand. It was derived from a focus group discussion held in Chiang Mai (June 3, 2005). The group consisted of academics, forest officials from Bangkok and surrounding areas, and selected members of MoNRE's strategy team. The attempt was to identify management solutions and respective responsible agencies. One day before the focus group convened, an environmental forum was held to gather issues, ideas and recommended policy responses from stakeholders including, monks, urban, rural and ethnic citizens, local NGOs, academics, and representatives from local and central governments. The mind map summarizes the issues and the solutions discussed in the environmental forum and in the focus group.

To construct the mind map, three questions were raised following the PSR model. However, since we were well aware of the state of our forests, we omitted the question about the state of the forests. The three questions used are: (1) what are the causes of deforestation, (2) what are the solutions or remedies for the problems, and (3) who should be responsible? For example, if the answer to the first question is the need for

land by farmers and by land speculators, different responses from different agencies will be needed. The answers to these problems are summarized and presented in Table 3.3. It is apparent that to overcome an environmental problem, it is likely that more than one agency need to be involved. Therefore sectoral management is unlikely to succeed unless the agencies are highly coordinated in terms of activities, timing and budgets. In addition, these would need to be co-ordinated on the basis of geographical areas or the ecosystem.

Figure 3.2 Mind Map on Deforestation



Source: Focus Group Discussion, Social Research Institute, CMU,June 3rd 2005

Among many pressures on the forests as shown in Table 3.3, population increase and the lack of career choice are thought to have forced local inhabitants into more encroachment of forest areas. Suggested solutions are to provide villagers with family planning and education services. The policy of prohibiting human use of protected areas was also cited as a cause of deforestation. The denial of access to local inhabitants who have relied on the forest for their livelihood reduces the incentives for the surrounding villagers to help guard the forests but instead this encourages them to engage in a survival strategy of extracting forest resources which are protected by law but are *de facto* under open access regime. Solutions suggested from the participants include Community

Forest Bill, clear demarcation of forests and village settlements, the provision of legal protection for community forest volunteer guards and so on. It is apparent that to overcome the deforestation problem, a large number of measures involving many agencies will have to be undertaken.

Another type of causal map can be constructed to show the sources of environmental degradation and the agencies responsible. This map was constructed from an environment forum on degradation of marine and coastal resources attended by the private sector (fisheries and processing sectors), academics and government officials held on the 7th of April 2005. The map is shown in Figure 3.3. To understand this diagram, the readers need to read from the bottom which indicates the causes of degradation leading up to the top which suggests the various agencies needed to help solve the problem. Again, the PSR model is the conceptual framework behind this diagram.

Over-extraction of marine resources is one of the main causes of marine resource degradation. The commercial fishing fleet is too large, and when combined with pollution and human-induced mangrove destruction, natural reproduction capacities have been threatened. It should be noted again that the problem requires management efforts from a wide variety of agencies. Moreover, local governments are often the *de facto* manager of these areas.

Environmental problems tend to be specific to each area or vary from place to place. Figure 3.4 shows the causal map of air pollution in Chiang Mai based on the PSR framework. The information is extracted from a study on air pollution conducted by the Social Research Institute. The main source of air pollution in Chiang Mai is open burning from agriculture and cremation as the city and the rural areas are quite close. In Chiang Mai, castle-like decorations to cover the coffin are popular, but as they are made from paper and foam, burning them releases significant pollution. Therefore one of the solutions is to educate the public and the monks about the health impacts of cremation. In addition, social pressure can be exercised to reduce the desire for the decorations. According to the true tradition, the decoration should only be used for royal members; using the decorations by the general public would be a bad omen.

To solve an environmental issue in a locality, social instruments such as education and campaigns are important means. Again when it comes to urban pollution issues, local governments' action is a necessity.

Table 3.3 Deforestation; *Causes, Measures, and Agencies*

No.	Causes	Measures	Agencies
1	**Population**		
	1.1 Increase	✧ Family planning	➢ MoH
	1.2 Migration	✧ Citizenship	➢ MoI
	1.3 Move up from Low Land	✧ Demarcation of forest areas ✧ Higher highland tax on land transfer	➢ MoNRE ➢ MoI
2.	**Policy**		
	2.1 "People and Forest" Policy: No legal protection for forest volunteers	✧ Community Forest Bill ✧ Setting up clear demarcation line for community in forests ✧ Recognizing all villagers residing in the protected areas ✧ Strengthening communities ✧ Reforming forest policies	➢ MoNRE ➢ MoNRE ➢ MoNRE/MoI ➢ MoI/Local Community ➢ MoNRE/MoI
	2.2 Conflict (Conservation VS Tourism)	✧ Controlled tourism ✧ E-national parks ✧ Landslide control ✧ Declaring unsafe areas (landslide) ✧ Monitoring (off-road, protected areas)	➢ MoNRE/MoTS ➢ MoNRE/MoTS ➢ MoJ/MoNRE ➢ MoJ/MoNRE ➢ MoNRE/Local Community
	2.3 Discrimination (Tourists VS Local Residents)	✧ Community-based tourism	➢ Local Community/ MoTS
3.	**Law**		
	3.1 Obsolete	✧ Revising 1984 national forest policy ✧ Money laundry law against illegal loggers ✧ Adopting "best practices" standards in law ✧ Designating protected areas according to ecological system	➢ MoJ/MoNRE ➢ MoJ/MoNRE ➢ MoJ/MoNRE ➢ MoJ/MoNRE
	3.2 No Incentive	✧ Granting tree title deeds (green title deeds) ✧ Recognizing "settlements in forests" under certain conditions	➢ MoNRE/MoI ➢ MoNRE/MoI

No.	Cause	Measure	Agencies
4.	**Lack of New Knowledge, Consciousness**		
	4.1 Forest Officials	✧ Researching on biodiversity by cooperating with universities	➢ MoST/MoNRE
		✧ Researching on geology by cooperating with universities	➢ MoST/MoNRE
		✧ Setting up plant species Institute	➢ MoST/MoNRE
		✧ Capacity building	➢ MoNRE
		✧ Researching on sponge and pump effect of forests	➢ MoNRE
		✧ Researching on geological structure of forests	➢ MoNRE
	4.2 General Public	✧ Developing & disseminating ecological knowledge management at village level	➢ MoNRE
		✧ Geological survey maps	➢ MoNRE
		✧ Promoting rubber plantations	➢ MoNRE/MoAC
5.	**Lack of Career Choice**		
	5.1 Education	✧ Practical training in vocational courses	➢ MoE
		✧ Promoting higher education for women	➢ MoE
		✧ Promoting non-agricultural careers for women	➢ MoL
6.	**Demand for Land**		
	6.1 Agriculture	✧ Land use zoning	➢ MoAC
		✧ Avoiding teak plantations on higher slopes to prevent landslide	➢ MoAC
	6.2 Land Speculation	✧ Progressive taxation	➢ MoF/MoNRE
	6.3 Tourism Resort	✧ Risk areas taxation	➢ MoF/MoNRE
		✧ Waterfront taxation	➢ MoF/MoNRE
		✧ Controlled road construction	➢ MoT
7.	**Demand for Timber**		
	7.1 Houses	✧ Wood recycling	➢ MoIndustry
		✧ New building materials	➢ MoIndustry
	7.2 Fuel	✧ New energy sources (biomass, solar, etc.)	➢ MoEnergy
	7.3 Small Business	✧ Wood saving technology	➢ MoIndustry
		✧ Value-added wood business	➢ MoIndustry
		✧ Supporting small wood businesses	➢ MoIndustry
		✧ Promoting small plantations	➢ MoAC

Source: As from Figure 3.3

Figure 3.3 Cross-sectoral management of an environment problem

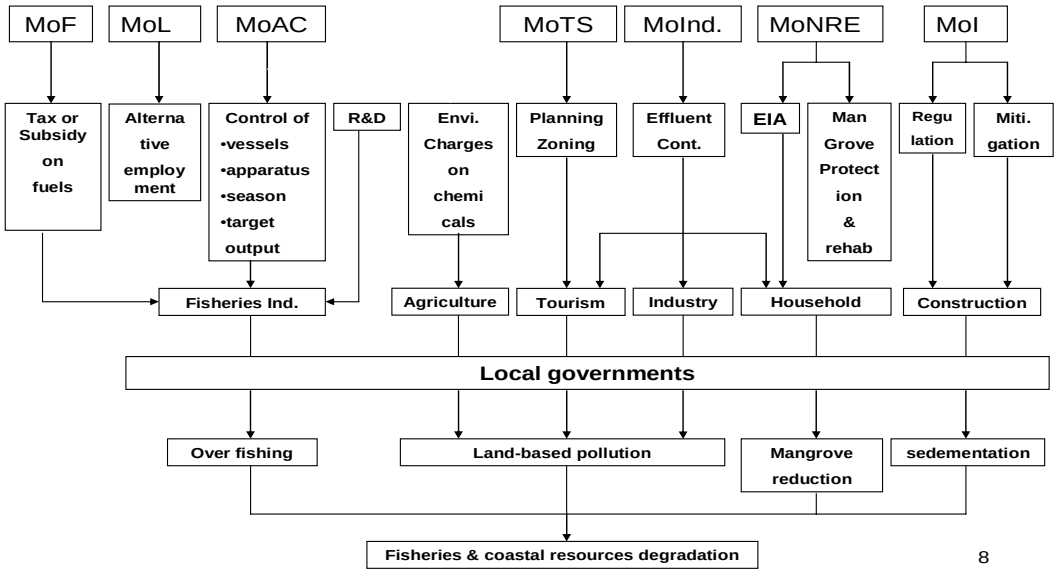
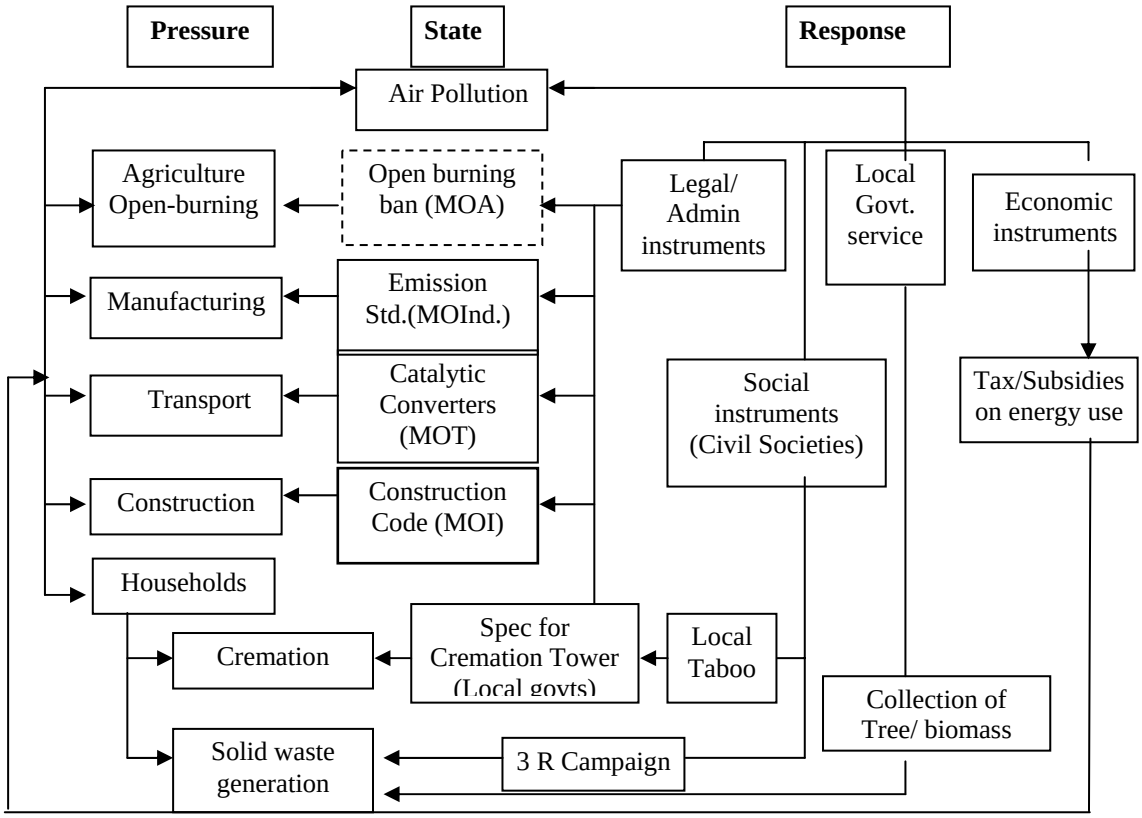


Figure 3.4 Chiang Mai Air Pollution



From Figure 3.2 to 3.4, it is clear that environmental problems are generated by multiple stakeholders. Sometimes government agencies exercising their own mandate in order to overcome one environmental issue may create or exacerbate another environmental issue. For instance, in order to reduce air pollution, local governments or the transport ministry may order that the number of private cars should be reduced. Opposing this, the Department of Highways may decide to construct more roads to reduce traffic congestion and pollution. Thus, sectoral management can lead to conflicting results and a waste of resources.

In another example, some districts report that a local pond was dug three times a year by different agencies to provide better water storage which resulted in greater wastes of resources.

Devolution of environmental responsibilities to local governments is one attempt to rectify this problem. However, currently, local governments are still very weak and lack technical, social and financial expertise to carry out environmental management properly.

In our phase 1 report, we listed a large number of environmental issues. If the above PSR framework is applied to them, one would come to the same conclusion as the three case studies elaborated in this section, that is, the most basic or fundamental or underlying component in most, if not all, of our environmental problems in Thailand is institutional. Managerial capacity especially, at both local and central levels, is the necessary condition across all environmental sectors.

It has been shown in this section that to handle an environmental issue in a holistic manner would require that at least three conditions be met. First multiple tools from multiple agencies are needed at the same time and effective and smooth agency collaboration is essential. Second, another key success factor would be the participation of the public in environmental management. This could be stimulated through mainstreaming environmental awareness. The last and probably the most important is the capability of local governments who exercise day-to-day environmental management.

4. National Environment Strategy and Budget Allocation

In the past, national economic and social development plans were central to Thailand's national development strategy. These plans served as a reference for all ministries in their budget requests. New ministry and department initiatives received funding in the budget only if they were consistent with or mentioned in the plans. More recently, line ministries found a new way to get budget approval: by preparing their own sectoral plan, such as the medium-term environmental plan. Once the sectoral plan was approved by the Cabinet, it could also serve as a budget reference.

With the Thaksin administration this process has been abolished, as the Prime Minister felt that under sectoral planning the government could not direct the economy as desired. The current directive is now for all ministries to follow the centrally-approved administrative plan (*Phan borihan ratchakan phaen din*). From 2005 on, all line ministries will have to prepare a business plan (*Phaen patibat ratchakan*) which is consistent with the government plan.

The National Plans, such as the forthcoming (10^{th} NESD Plan) and the medium-term environmental plan, still need to be prepared because they are required by their respective legislation. They will now serve only as guidance, with their importance as a budget reference reduced. These five-year plans could also provide a forum for voicing public concerns and suggestions for new initiatives. Since the government's sector-based business plan is relatively broad, there is still room for new ideas, initiatives or changes in project details to better serve the citizens.

The Government Plan announced after the election in 2005 has 10 strategic issues; 1) poverty eradication, 2) human resources development and a high quality society, 3) balanced economic structure and competitiveness, 4) natural resources and environmental management, 5) foreign affairs and international economic cooperation, 6) legislative development and good governance, 7) promotion of democracy and social movements, 8) national security, 9) globalization response and 10) implementation mechanisms.

The government strategies with respect to natural resources and environmental issues are as follows:

-Balanced use and conservation for sustainable development,
-Protection, and equitable and sustainable utilization of biodiversity,
-Restoration of soil resources,
-Integrated water management,

-Public participation in management of natural resources and environment and
-Control of pollution.

The budget for each strategy is given in Table 4.1. The natural resources and environment portion accounts for 1.55 percent of the total government budget, but there is more funding for environmental issues within local governments. Subsidies to local governments total 9.3 percent of the budget, but since this money is awarded in a block grant, it is impossible to determine how much is being spent on environmental issues.

Table 4.1 The 2006 Annual Budget Plan of Thai Government

No.	Strategy	Amount (million baht)	Percent
1.	Poverty Eradication	**70,059.8**	**5.15**
2.	Human Resources and Social Development	**437,772.9**	**32.19**
3.	Balanced Economic Structure and Competitiveness	**179,148.4**	**13.17**
4.	Natural Resource and Environmental Management	**21,089.0**	**1.55**
	4.1 Natural Resource Protection and Utilization	(10,250.4)	(0.75)
	4.2 Biodiversity Protection and Utilization	(156.4)	(0.01)
	4.3 Integrated Water Management	(5,847.8)	(0.43)
	4.4 Ensuring Participation of All Sectors	(4,251.3)	(0.31)
	4.5 Waste, Sewage, Dust, Gas, Air pollution and Noise Control	(583.1)	(0.04)
5.	Foreign Affairs and International Economic Co-operation	**8,802.4**	**0.65**
6.	Law Improvement and Good Governance Promotion	**46,140.8**	**3.39**
7.	Democracy and Civil Society Promotion	**19,025.1**	**1.40**
8.	National Security	**110,084.6**	**8.09**
9.	Preparation for Globalization Impact	**81,231.3**	**5.97**
10.	State Expenditures	**386,645.7**	**28.43**
	10.1 Salaries and Wages	(114,502.5)	(8.42)
	10.2 Government Debt Management	(146,130.2)	(10.74)
	10.3 Financial Support for Local Governments	(126,013.0)	(9.27)
	Total	**1,360,000.0**	**100.00**

Note: Classified according to budget allocation strategy
Source: Bureau of the Budget

The annual budget for natural resources and environmental management (NRE) consists of (1) natural resources conservation budget and (2) environmental development budget. The conservation budget covers activities related to forests, water resources, soils and land

development, minerals and geological resources and energy. Environment development budget includes pollution prevention and control, activities which mitigate the impact of pollution on livelihood and health. Prior to 2001, data were compiled from the project budgets. From 2002, the Bureau of the Budget started to group projects into two programs: (1) the Program for conserving and developing natural resources and (2) the Program for Environmental Development. Therefore the data for the period between 2001 and 2003 were taken directly from these programs. From 2004, the Bureau of the Budget has grouped budgets according to output rather than activities or projects. In Table 4.2, the total NRE budget and its distribution between conservation (natural resources) and development (NRE minus NR budget) are shown. Overall, since fiscal year 2000, the percentage of the conservation budget has been increasing each year while the percentage of the development budget has been declining.

Table 4.2 Environment Budget (2000 – 2005)

Fiscal Year	Total NRE Budget (million baht)	% of Total Budget	Distribution between Conservation and Development in percentage	
			Conservation	Development
2000	12,805	1.49	31	69
2001	18,280	2.01	63	37
2002	17,260	1.69	58	42
2003	14,840	1.48	65	35
2004	12,745	1.24	88	12
2005	14,314	1.19	89	11

Source: Bureau of the Budget

To consider Table 4.3 in more detail, among the four main natural resources, the vast majority of funding was directed to the conservation of forests. Since 2001 this program has received more than 8,000 million baht annually, except a dip in 2004. The budget for soil and water conservation varied widely; rising from zero in FY2000, to more than 2,000 million baht in 2001. It dropped down to 263 and then 95 million baht in 2002-3, then rose above 2,000 million baht again in 2004 and 2005. Although fisheries and minerals also shared this budget, the total budget allocated for these two resources was roughly 12 percent which was still less than the forest budget.

The environmental development budget has been dropping from almost 9,000 million baht in 2000 to only about 1,600 million baht in 2005. This reflects the completion of large infrastructure projects and decentralization of pollution management to local governments.

Table 4.4 indicates the distribution of the budget within the Ministry of Natural Resources and Environment in 2005. It should be noted that the budget allocated for pollution was quite small accounting for only 4.22 percent of the budget. The proportion of the budget that provided the link between MoNRE and the local governments was the smallest accounting for only 3 percent of the total Ministerial budget.

Currently, the Thai government has devoted about slightly over one percent of its national budget for environmental management to central government agencies (Table 4.2). The environmental budget of the Thai government has been on a decreasing trend. This is partly because environmental responsibilities have been delegated to local governments. Some of the environmental expenditures may also be included in the central budget (*Ngop Klang*) the use of which is exclusively the prerogative of the Prime Minister. Some of this central budget could be used to redress environmental problems. However, it is not possible to separate environmental expenditures in the budgets of local governments or Ngob Klang. It is worth noting, however, that more than half of the MoNRE budget goes to conservation of forests and biodiversity.

Table 4.3 Natural Resources Conservation and Environmental Development Budget

Unit: million baht

Fiscal Year	Natural Resources Conservation Budget					Environmental Development Budget
	Forests	Soil & Water	Fisheries	Minerals	Total	
2000	3,579	0	380	0	**3,959**	**8,846**
2001	8,884	2,201	400	0	**11,485**	**6,796**
2002	8,159	263	313	1,268	**10,004**	**7,256**
2003	8,170	95	320	1,084	**9,669**	**5,171**
2004	7,349	2,627	804	380	**11,161**	**1,585**
2005	8,778	2,683	819	419	**12,699**	**1,615**

Source: Bureau of the Budget

Table 4.4 The 2005 Annual Budget within the Ministry of Natural Resources and Environment.

Output	Amount (million baht)	Percent
Forest/ Fauna and Flora	8,800.5816	61.40
Water resources	2,660.8416	18.56
Mineral resources	418.6643	2.92
Coastal resources	819.1266	5.71
Pollution	604.5464	4.22
Education and Promotion	580.8155	4.05
Local Government Role	449.5040	3.14
Total	**14,334.0800**	**100.00**

Source: Bureau of the Budget (2005)

5. Prioritization of Environmental Issues

With limited resources and a plethora of environmental concerns, funding agencies in Thailand must decide which activities to fund and how many resources each activity will get. Thus, the process of prioritization is crucial to the efforts to protect environmental values.

5.1 General Discussion on Prioritization

There are several characteristics of environmental issues that make prioritization difficult. These characteristics arise because of the essential nature of the environment. *First*, environmental issues are varied in subject matter. Our phase 1 report identified at least 67 different issues. *Second*, environmental issues are spatially related, that is not all locations have the same problems and the same problems may be different in kind and severity in different locations. *Third*, some environmental issues are seasonal. For example, water shortages are heightened in the dry season but when the rain comes, floods become a concern. So if the public was asked to rank priority of water shortage, the weight they would give to the issue may be different in different seasons. *Fourth*, some environmental issues are high-impact, one-time events such as oil spill or nuclear leakage or even tsunami in Thailand. Although the impacts can be catastrophic, planning for such events is often neglected in normal times. *Fifth*, some environmental impacts are incremental or cumulative and do not indicate severe impacts until after a certain threshold. This is the case with hazardous substances. Finally and very importantly, valuation of environmental damage is difficult and costly to conduct. Thus although there are now a number of new valuation techniques, they have not been used extensively. Consequently, environmental issues have not caught the attention of the public and the policy makers as others would have.

Prioritization is useful because it forces the agency to think clearly and strategically. Providing the most benefit from the available resources is an essential efficiency principle. Further, the process of inter-sectoral (water, forests, urban environment, etc..) discussions provides each participant with a view not only of their own interests, but the interests of others that may have different priorities. In the end, it is not the exact ranking of each concerned that matters, but the cluster of issues that are considered most important and deserve attention, as opposed to issues that are less important.

There are several ways to prioritize environmental concerns. First, the indicator approach, in which several quantitative indicators are selected for a range of problems and then ranked accordingly, is now very popular in Thailand. For example, indicators may include the geographical areas of the problem, or the number of people affected, e.g. deforested areas to total national areas, the number of people in repetitive drought stricken areas.

This process often provides ranking capability or relevant answers in one sector, but will have difficulties comparing across sectors, in the same way that one cannot compare apples with oranges. How can one compare 10 million acres of deforested land with 10 million acres of salinity-affected soils, or to the extinction of some avian species. Further, this method also relies heavily on the availability of data for a particular concern. This lack of data could result in bias in the choice of indices, or perhaps that certain problems the data for which are unavailable are repeatedly overlooked until sufficient data are gathered. Furthermore, the choice of weighing units could provide bias as previously shown in Section 2 where the natural resource index of Thailand showed an improving trend owing to the inclusion of a small but strong indicator, the use of groundwater.

The second approach is the expert judgment approach, in which one or several experts in environmental disciplines are asked to consider an array of problems and choose, quantitatively or qualitatively, which are worthy of action. Usually, this method is used together with the indicator approach. This process has advantages, such as providing personal expertise gained over many years and the personal orientation of the expert(s). However, the other side of this is that the experts may lack experience in some of the choices, and personal biases may arise leading to a skewed result. Thus, while this process may work well in individual sectors, it can present problems if inter-sectoral issues arise and the "experts" lack diversity or experience outside their sectors.

The third approach is the valuation approach, which seeks to quantify the economic value of environmental concerns. This approach overcomes the weighting problem and the personal biases of consultants by using money value as weights. Another advantage is that it allows comparison across sectors, for example, by comparing baht value of forests lost with baht value of reduced production from soil salinity. The disadvantage is that a certain valuation technique relies on the extraction of the willingness to pay of the respondents. The accuracy of the results depends on how the scenarios are framed and on the quality of the questionnaire and the interviewers.

Another option is to use a social approach in determining priority. The most comprehensive method under this category is to hold a referendum, but this can be very expensive to perform. Alternatively, citizen surveys can be used to determine what a broad range of local people believe to deserve attention. These surveys require specific geographical and time bounds, and results can be ephemeral. They also rely on the personal interest of the citizens in environmental issues, as well as their personal knowledge.

Which method of prioritizing environmental concerns is more appropriate depends on the level of analysis. First, at the national level when cross sectoral policy issues are the subject of the exercise, the valuation method tends to be superior. Secondly at the sector level, indicator and expert judgment approach tends to be more suitable. Thirdly, at a geographical level or an ecosystem level such as a village or a watershed, the social approach either through a citizen survey or through some kind of public participation process should be the exercise.

The following subsections provide examples of prioritization method used in Thailand.

5.2 Indicators and Expert Judgments Approach

The most widely used technique for prioritization at both the national and regional levels in Thailand is the use of indicators and expert judgments. This is most often done by commissioning a consultant to design a set of “ideal” indicators. Then several expert meetings are held to focus and streamline these indicators to obtain a subset of “real life” indicators for which data are available. Next, an expert judgment is used to provide scores for each indicator. The final outcome is the sum of all expert judgments. This technique was seen earlier (Sections 2.1 and 2.2) in the analysis of Thailand’s sustainability indicators. The strength of this technique is that it is less costly, time saving and generates external knowledge through expert discussions.

The weakness is that the outcome can be biased by both the selection of experts and indicators. For example, when social scientists are excluded (as is often the case), issues that are socially complex, morally ambiguous, and have unmeasured impacts may be overlooked in favor of issues with concrete technical evidence. Further, personality can play a role, with some experts dominating others in the discussions.

Availability of data is also important for indicator selection. Therefore an issue of the utmost importance, with severe and hazardous

implications, may fail to be chosen because it lacks current information. The following case studies represent attempts to prioritize environmental issues both at the regional and national level.

(1) Strategic Environmental Framework Phase II (SEF II)

The Strategic Environmental Framework (SEF) is a project created to help the Asian Development Bank (ADB) make funding decisions about infrastructure project in the Greater Mekong Subregion. The Project was implemented with consulting inputs from the Stockholm Environment Institute (SEI), in collaboration with the UNEP Regional Resource Centre for Asia and the Pacific (UNEP RRCAP) and the Mekong River Commission (MRC). It combines analytical, participatory and policy oriented processes into a strategic platform for guiding investment decisions in the transport, water resources development and environmental sectors in the GMS. Its ultimate goal is to ensure that these investments are environmentally and socially sustainable, and that environmental and social aspects, as well as cumulative impacts, are considered at an earlier stage in the planning process than currently takes place.

The first phase, SEF I, began in 1992, and involved data collection. Currently, SEF II is promoting sustainable development through capacity building by undertaking Environmental Performance Assessments (EPA) at the national and subregional levels. SEF II seeks to prioritize environmental concerns in each member country through expert meetings and analysis of appropriate indicators.

SEF II involves two sets of stakeholders. The first set is the governments of the involved countries: Thailand, Lao PDR, Cambodia, China, Myanmar and Vietnam. The second set is the funding and expert agencies, including UNEP (serving as Secretariat, and providing technical support), ADB (providing money from the Japanese government), Japan's Institute for Global Environmental Strategies (IGES) and National Institute for Environmental Studies (NIES). The project is directed through a steering committee made up of national stakeholders.

In order to prioritize their work, expert panels within SEF II created a list of 13 concerns common to each of its member countries, and an additional list of three transboundary or subregional concerns (Table 5.2.1).

It is obvious that this list is quite expansive, allowing room for further prioritization at the national level.

Implementation of SEF II by Thailand began in May, 2004 at a meeting in Bangkok. The Department of Environmental Quality Promotion

(DEQP) is the focal point for SEF II, and the National Coordinating Committee (NCC) environmental experts are appointed to advise the assessment.

Table 5.2.1 National and Subregional Concerns

Country Level Policy Concerns	Subregional or Transboundary Policy Concerns
1. Land degradation **2. Threats to biodiversity** **3. Inland water pollution** **4. Inadequate waste management** **5. Toxic contamination** **6. Air pollution by stationary sources** **7. Mobile source pollution** **8. Threats to coastal zones** **9. Climate change** **10. Ozone layer depletion** **11. Water resources** **12. Fish resources** **13. Forest Resources**	**1. Threat to Mekong's vital functions** **2. Illegal trade in resources, wildlife** **3. Absence of harmonization of policy targets and evaluation tools**

Source: SEF II (2003 - 2005)

In order to move toward the SEF II objective of sustainable development through capacity building, the Thai EPA established an analysis of available information. The project has identified concerns and prioritized them, then identified ***Pressure State, and Response (PSR)*** indicators for these concerns and performed a policy and institutional Gap Analysis of these concerns.

The prioritization of concerns in Thailand began by selecting the appropriate indicators and performing a gap analysis. To do this, a peer review committee with EPA experts in various scientific disciplines related to the chosen environmental concerns, from academia and independent agencies, was established. However, this committee did not include any social scientists. Therefore, it must be noted that the selection and prioritization of concerns may have failed to adequately address social issues.

Following the gap analysis, the National EPA selected core indicators, and is preparing fact sheets for each PSR indicator and a report on these. In addition, the project also selected and is starting to implement two case studies (forest resources and inland water pollution) to be undertaken in Ubon Ratchatani Province.

In selecting national concerns, each country is to consider the national importance and public perception of the concern, the existence of clear policy targets to permit an assessment of performance, and should choose 5-7 concerns. In Thailand, National-EPA (N-EPA) ranked each of the 13 concerns on a scale of 1 to four (1 being highest) in the following areas: existence of a policy target, adequate information on trends, existence of an international convention or agreement, and existence of a responsible government agency. The scores were totaled, and the concerns ranked, with a low score meaning high concern for this issue in Thailand.

Table 5.2.2: Thailand Environmental Concerns under SEF II (Scores in Parentheses)

Higher Concerns	Lower Concerns – Lacking Data
Inland Water Pollution (42)	Air Pollution – Stationary Sources (85)
Water Resources – Agriculture, Irrigation (50)	Biodiversity (87)
Forestry (66)	Mobile Air Pollution (96)
Inadequate Waste Management (67)	Fisheries (100)
Toxic Contamination (68)	Coastal Conservation (103)
Land Degradation (70)	Climate Change/Ozone * (118)

*This concern was added to each country's list due to the existence of ONEP funding.

However, there are two problems with this set of ranking criteria. First, the requirement for existing information means that many significant problems that have not yet been addressed will continue to be ignored. Thus new environmental problems, or those that have a sudden spike in intensity, will not be addressed, and only the current concerns will be considered *ad infinitum*. This requirement has dominated the selection process, ensuring that only concerns that have been previously studied will move forward under SEF II and the N-EPA. This result is obvious in the ranking of biodiversity in the lower seven concerns, because there is little information on the abundance and population trends of the species it is supposed to manage.

Second, the experts employed by the N-EPA may have introduced their own experiential biases into the consideration of the criteria. This means that, in the end, the list of concerns merely reflects the personal preferences of the committee. It also means that the results of any gap analysis will be ignored, since by definition, a gap analysis seeks out environmental problems that have yet to be addressed.

Following the selection of concerns, each concern is assigned a set of ***Pressure-State-Response*** indicators to determine whether Thailand's efforts are impacting the environmental concerns. These indicators are then ranked according to whether they do indeed provide any indication of

effect. For example, with respect to forestry, Pressure indicators included the rate of logging, the amount of fuel wood produced, the rate of deforestation, the increase in population, and encroachment into protected areas. The first two were rejected because there is no information on them since 1989, when logging was banned in Thailand. The last three ranked high because each of them has historical and current quantitative measurements. In the end, the *State* indicator was chosen as Existing Forest Cover, and the *Response* indicator finally accepted was the total amount of designated protected areas.

This selection process points out biases in the process. For example, economic indicators were rejected because there were no economists on the selection committee. On the other hand, the profusion of studies analyzing forest cover in Thailand ensured that criteria about changes in land use would be selected. Furthermore, the State indicator informs about the actual state of forests, but the Response indicator merely shows what actions have been taken on paper, without any real-world measurement of the effectiveness of forest protection. Thus, choosing this pair does not guarantee that forests are actually being protected in response to anthropomorphic ecological changes.

All of these analyses have led to the selection of a pilot study in Ubon Ratchatani province to determine the validity and efficacy of the indicators. Ubon was selected because it has a provincial policy on environmental protection, it has an active staff at the provincial and regional levels, the staff is ready and willing to build its capacity, it is located on the Mekong River, providing a link to the Mekong Region, and it allows the study of a transboundary project by the International Timber Trade Organization (ITTO).

The strategy of choosing the issues and indicators first and then selecting the area study is contrary to the nature of environmental problems. Priority of environmental issues varies from place to place. In general, an area is first selected, and the stakeholders then identify their priorities.

(2) World Bank

In 2000, the World Bank published an Environment Sector Strategy Report that prioritizes functional improvements and priority investment areas using a 5-step approach of situation assessments and expert judgements. (see Figure 5.2.1) The Bank concluded that three priority areas for functional improvements are (1) governance (restructuring, decentralization and compliance), (2) financing (cost recovery, market

based instruments, and an Environment Fund) and (3) community empowerment (awareness, participation and disclosure). Priority investments for Bangkok were identified as air quality, wastewater, solid waste and decentralization.

For the Chao Phraya river basin, priority investments areas were reported as water management, dam safety, groundwater protection and basin management. These prioritization results reflect the paradigm shift in the World Bank Operation philosophy to (1) governance issues and (2) priority areas where loans could be made expediently and provide safe yields.

Figure 5.2.1 World Bank: Setting priorities of environmental issues in Thailand

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

↓

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

↓

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

↓

4. Targeting World Bank Assistance:
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

↓

5. Framing the Strategy for Partnership:
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.

Source: The World Bank, November 1999.

5.3 Citizen and Expert Surveys

From a social point of view, prioritization is best conducted through an official referendum but this is a costly process. Referenda are therefore used very rarely and only for constitutional surveys. For lesser issues, citizen surveys may be employed. In Thailand only one survey on environmental issues has been performed.

In a study to determine research directions for solving urgent environmental problems, Mingsarn et al. (2001) surveyed 1000 Thai residents, 138 government and private sector executives, 64 members of the legislature, and 2,892 officials or representatives from Tambon Administrative Organizations (TAOs). The results suggest that all groups of environmental stakeholders consider NRE problems as secondary to drugs (Table 5.3.1, 5.3.2 and 5.3.3). The proportion of those ranking NRE problems first is much lower than those choosing drug problems.

Tables 5.3.4, 5.3.5 and 5.3.6 show the various natural resource problems. Forests loss is identified by all groups as the most severe problem. Second is flood, but for executives and local administrators it is water shortage in the dry season.

The most critical environmental problem for the public (Table 5.3.7), is air pollution. Executives see water pollution problem as being most critical, while the legislature, executives directly related to NRE management, and local government officials believe that solid waste is the most severe urban environmental problem (Table 5.3.8 and 5.3.9). The responses from local governments also stated their need for training in solid waste management.

This study also confirms that public knowledge about environmental problems is inadequate. Most respondents participate in environmental conservation activities that produce a clear private gain, such as energy savings and using both sides of paper. However, local government executives appear to be knowledgeable about environmental responsibility and have shown readiness to undertake activities related to natural resource and environmental management. Examples include the management of small irrigation systems, local waterways, maintenance of local water resources and community forests. Both Provincial and Tambon administrators want greater power to issue licenses for various activities within their administrative areas. Further, Tambon administrators want more power to impose fines for violating local regulations.

Table 5.3.1 Public opinion: the most critical problems that action should be taken immediately in Thailand*

No.	Problems	Percentage of opinion
1	Amphetamine/drugs	66.3
2	Environment (pollution, waste etc.)	11.5
3	Crimes	8.5
4	Natural resources degradation	4.7
5	Prostitution	3.4
6	Traffic congestion	2.9
7	Others (ex. corruption)	2.3
8	Social and economic problem (ex. poverty)	0.3
9	Not reply	0.1
	Total	100.0

Note: * See Annex II (Table 1) for more details.
Source: Mingsarn et al. (2001)

Table 5.3.2 Executive opinion: the most critical problem that action should be taken immediately in Thailand

Unit: Percent

No.	Problems	Total	Legislators	Corporate Executives	Central Govt. MoNRE Officials
1	Amphetamine/drugs	60.71	63.49	62.07	56.76
2	Environment (pollution, waste etc.)	14.29	15.87	11.49	16.22
3	Natural resources degradation	14.29	14.29	11.49	17.57
4	Others (ex. Corruption)	7.59	3.17	10.34	8.11
5	Crimes	2.23	1.59	3.45	1.35
6	Traffic congestion	0.89	1.59	1.15	-
	Total	100.00	100.00	100.00	100.00

Source: Mingsarn et al. (2001)

Table 5.3.3 The most critical problem faced by TAO

No.	Problems	Percentage
1	Amphetamine/drugs	40.34
2	Natural resources degradation	26.87
3	Environment (pollution, waste etc.)	23.63
4	Economic problems	3.86
5	Traffic congestion	1.78
6	No critical problems exist	1.01
7	Crimes and gambling	0.87
8	Social problems	0.52
9	Others (ex. land, infrastructure)	0.52
10	Reserved forest and public land incursion	0.21
11	Prostitution	0.14
12	Natural resources depletion	0.10
13	Diseases	0.10
14	Local government leaders' lack of vision	0.03
	Total	100.00

Source: Mingsarn et al. (2001)

Table 5.3.4 Public opinion: the most critical natural resources problems in Thailand*

No.	Natural Resource Problems	Percentage of opinion
1	Forest depletion	47.9
2	Flood	26.3
3	Water shortage	16.2
4	Mangrove depletion	3.9
5	Alkaline soil	2.7
6	Soil erosion	2.6
7	Not reply	0.4
	Total	**100.0**

Note: * See Annex II (Table 2) for more details.
Source: Mingsarn et al. (2001)

Table 5.3.5 Executive opinion: the most critical natural resources problems in Thailand

Unit: Percent

No.	Problems	Total	Legislators	Corporate Executives	Central Govt. MoNRE Officials
1	Forest depletion	76.34	74.60	79.31	74.32
2	Water shortage	8.93	11.11	5.75	10.81
3	Flood	6.25	7.94	5.75	5.41
4	Others (ex. natural resources degradation)	3.57	-	5.75	4.05
5	Soil erosion	2.68	4.76	5.75	1.35
6	Alkaline soil	1.34	-	2.30	2.70
7	Mangrove depletion	0.89	1.59	1.15	1.35
	Total	**100.00**	**100.00**	**100.00**	**100.00**

Source: Mingsarn et al. (2001)

Table 5.3.6 TAO opinion: the most critical natural resources problems in Thailand

No.	Natural Resources Problems	Percentage of opinion
1	Forest depletion	60.20
2	Water shortage	17.81
3	Flood	17.46
4	Soil erosion	1.73
5	Mangrove depletion	1.11
6	Alkaline soil	0.97
7	Others	0.73
	Total	**100.00**

Source: Mingsarn et al. (2001)

Table 5.3.7 Public opinion: the most critical environmental problems in Thailand*

No.	Environmental Problems	Percentage of opinion
1	Air pollution	36.9
2	Solid wastes	26.7
3	Industrial hazardous wastes	26.6
4	Water pollution	11.5
5	Visual pollution	3.5
6	Other environmental problems (ex. slum)	0.4
7	Other problems not related to environmental problems	0.2
8	Not reply	0.2
	Total	**100.0**

Note: * See Annex II (Table 3) for more details.
Source: Mingsarn et al. (2001)

Table 5.3.8 Executive opinion: the most critical environmental problems in Thailand

Unit: Percent

No.	Problems	Total	Legislators	Corporate Executives	Central Govt. MoNRE Officials
1	Solid wastes	33.93	46.03	17.24	43.24
2	Water pollution	22.77	9.52	28.74	27.03
3	Air pollution	19.64	25.40	24.14	9.46
4	Industrial hazardous wastes	13.39	12.70	13.79	13.51
5	Other environmental problems (ex. chemical use)	5.36	4.76	6.90	4.05
6	Visual pollution	4.91	1.59	9.20	2.70
	Total	100.00	100.00	100.00	100.00

Source: Mingsarn et al. (2001)

Table 5.3.9 TAO opinion: the most critical environmental problems in Thailand

No.	Environmental Problems	Percentage of opinion
1	Solid wastes	44.80
2	Air pollution	18.74
3	Water pollution	12.66
4	Industrial hazardous wastes	11.31
5	Visual pollution	9.96
6	More than one critical problems	2.01
7	Other problems not related to environmental problem	0.24
8	Pollution by agricultural chemicals	0.21
9	Not reply	0.07
	Total	100.00

Source: Mingsarn et al. (2001)

5.4 Economic Valuation Approach

The valuation approach attempts to apply economic values to environmental goods and services. For environmental goods that have markets such as forest resources, land and so on, the valuation method is straightforward and relies on prices determined by supply and demand.

However, not all environmental goods are marketable. This type of non-market environmental resources include tangible items such as protected wildlife, surface water or air quality, and less tangible items such as biodiversity and ecological services supplied through the hydrological functions of watersheds.

For the environmental goods and services with an existing market, valuation depends largely on the estimation of the quantity of goods and the scale of services multiplied by prices. In the case of pollution, environmental damage is often estimated based on abatement expenditures or medical expenditures caused by pollution. For non-market goods and services, economists created innovative methods through the use of surrogate markets or by estimating the willingness to pay to protect the environment (for sustained use, existence values and other non-use values).

As mentioned earlier, the valuation approach is superior to the indicator approach in that it provides a solution to the choice of weights by using the market prices or values people place on the environment. It also allows cross- sector comparison. However, since natural resources and environmental amenities consist of a myriad of goods and services, the completeness or the coverage of most studies is often weak. Nor does this type of study overcome the problem of reliance on existing data. Because of the completeness problem, valuation information is more reliable for ranking than for providing the actual values.

In Thailand, the valuation approach has been used to estimate the total economic value of forests including their non-market services. Among the well known studies are the estimate of the value of Khao Yai National Park (Mingsarn et al 1993), mangroves forests(Suthawan 1998), Mae Yom teak forests (Suthawan et al 1999), and wetlands (Penporn 2005). To compute environmental damage, simply place a negative sign in front of the relevant value.

The following table provides the most recent, albeit preliminary, estimates of environmental damage in selected years based on the valuation method (TDRI forthcoming), following the methodology used by Mingsarn et al (1999). All the values are adjusted to 1988 prices, allowing comparison over the years. The details of the estimating method and

underlying assumptions are given in Annex III. It is apparent from the table that by this method, deforestation remains the top environmental issue. Water and air pollution and waste management have become more important with growing urbanization. Soil degradation seems constant. The most glaring omission (owing to lack of data) in the table is the degradation of marine resources such as coral reefs, sea grass etc.

Table 5.4.2 provides the estimates in 2001 price which is closer to the prices today. Damage from deforestation cost the country over 150 billion baht per year.

Table 5.4.1 Environmental damage

unit: million baht

Sectors	1977		1997		2001	
1. Loss of forest resources	24,167	(1)	84,323	(1)	51,313	(1)
2. Costs of water pollution	2,513	(3)	11,214	(2)	10,863	(2)
3. Costs of soil degradation	8,399	(2)	7,513	(4)	7,311	(3)
4. Costs of waste management	1,646	(4)	4,725	(5)	5,372	(4)
5. Loss of wetlands	1,027	(6)	8,299	(3)	3,995	(5)
6. Costs of air pollution	216	(7)	3,131	(6)	3,974	(6)
7. Costs of overfishing	1,168	(5)	2,375	(7)	2,831	(7)

Source: TDRI forthcoming (2005)

Table 5.4.2 Environmental damage at market prices

unit: million baht

Sectors	2001(current prices)
1. Loss of forest resources	167,948
2. Costs of water pollution	19,173
3. Costs of soil degradation	12,904
4. Costs of waste management	9,482
5. Loss of wetlands	7,051
6. Costs of air pollution	7,014
7. Costs of overfishing	4,997

Source: TDRI forthcoming (2005)

5.5 Prioritization in a Unified Ecological Unit: Nong Bong Kai Wetlands

To reiterate, environmental issues vary from place to place. For example in an urban ecosystem, air pollution may be a more important issue than forests loss. In a rural setting, deforestation, forest fires, floods are certainly more important concerns than air quality. Therefore, prioritization, in an ideal situation, has to be conducted through a public participation process with the involvement of stakeholders. Recent management of Nong Bong Kai wetlands presents a system for prioritizing environmental problems in a unified ecological unit. The process is complicated, involving the amalgamation of local perception with scientific knowledge, as well as social and economic indicators. The following example shows how prioritization is conducted in a unified ecological unit in order to arrive at a management plan. In such a case, prioritization process could also be useful for conflict resolution.

Nong Bong Kai is a RAMSAR site, a wetlands site in Chiang Rai province near the Mekong River. It has undergone a comprehensive planning process which requires issue prioritization including scientific review and active public participation. This sub-section examines that planning process, looking at the specific steps involved and the criteria used to arrive at decisions.

The Nong Bong Kai wetlands were established in the 1960s as a man-made reservoir, and renovated in 1980. In 1975, the government declared it a Non-Hunting Area, and in 2001, it was named the fifth Ramsar Site in Thailand. It is surrounded by 12 villages in 2 sub-districts, and the people rely on the wetland resources (e.g. fishing and irrigation) worth approximately US$370,000 per year. ONEP and DANIDA are implementing a management planning process during the 2001-2006 timeframe that includes Nong Bong Kai and the Krabi Estuary.

The 2024 Vision Statement for Nong Bong Kai is “to have abundant water birds and fish species, and to increase the natural heritage and beauty of Nong Bong Kai lake for Ecotourism.” At the outset, there are three main factors that set the scope of a wetlands management plan. First, the boundaries of the planning area must be established, and those bounds can be either arbitrary administrative lines or ecosystem boundaries. Second, the local knowledge and attitude of people living in the area must be gathered and acknowledged. It is essential that the plan balance conservation with utilization of the wetland resources. Most importantly, participation in the planning process must include the government and local

stakeholders, or the acceptance of the plan's validity, and thus enforcement, may not be universal. Finally, principles of wetlands management plans include ecosystem management, implementation of the Ramsar Convention (conservation and wise use), and using a precautionary approach to decision making.

The first step involved delineation of the wetlands according to the 1999 Ramsar Convention, with results stored in the GIS. This included existing information, as well as new information gathered at the wetlands-complex (~ 100 sq. km.) and Nong Bong Kai wetlands-habitat levels (~ 16.6 sq. km.). Characteristics of each area are classified into three main components: biological factors, physical-chemical factors, and physical features. These characteristics were also stored in the GIS.

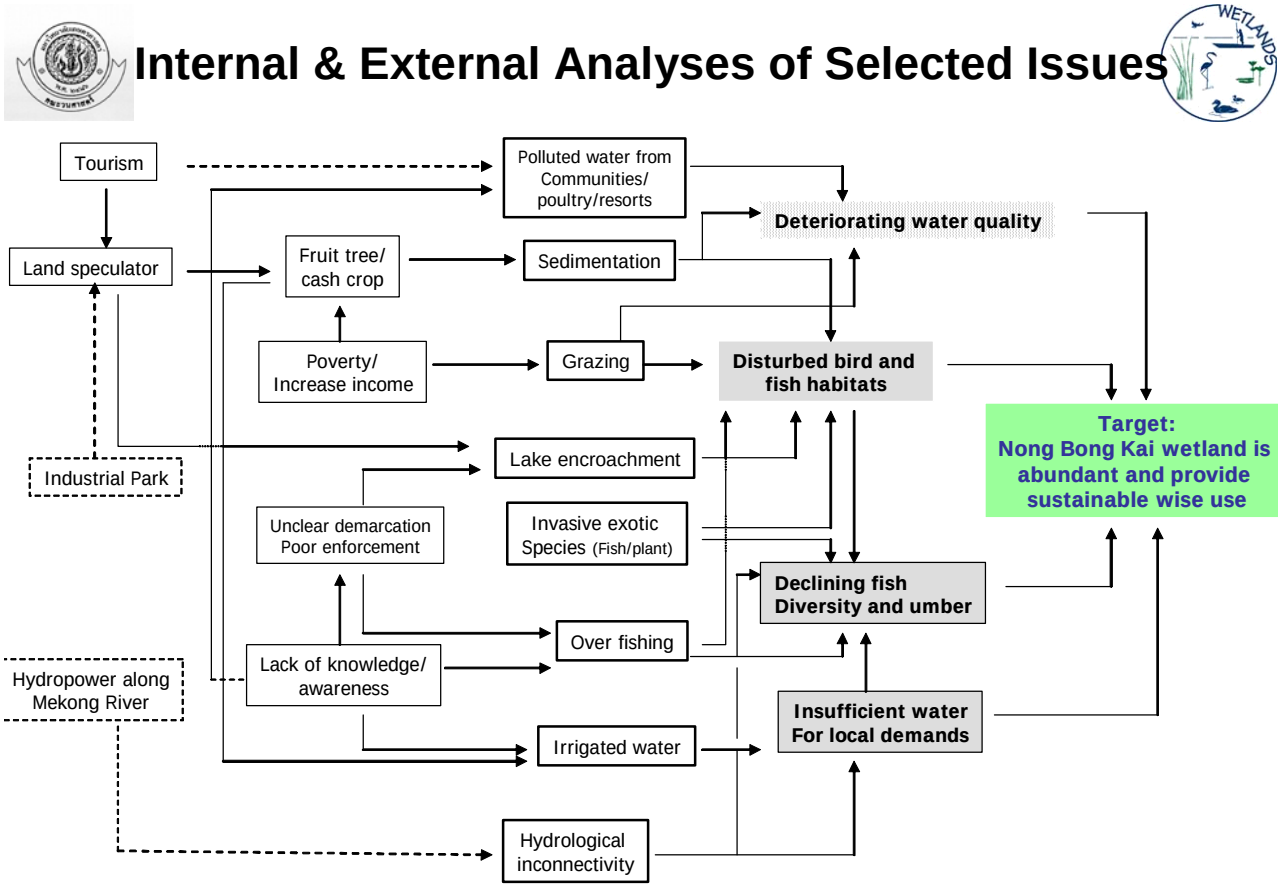


Figure 5.5.1 Causal Diagram of Wetlands Issues

Next, data concerning socio-economic and resource uses, economic valuation, and ecological characteristics of the area were collected and entered into the GIS.

The geographical area for planning includes the lake itself, the surrounding hills, and nearby agricultural areas. The multiple stakeholders define potential issues arising from human use of the wetland's resources, as seen in Table 5.5.1. These issues are linked in the causal diagram of Figure 5.5.1.

TABLE 5.5.1 Issues Affecting Wetlands Management

Issues Related to Water	Issues Related to Surrounding Lands
Water Level Water Quality Water Uses Lake Encroachment Fish and Wildlife Use of the Lake Management and Protection Future Water Demand	Runoff Contamination: Fertilizer, Pesticide, Sediment Resort Construction Land Speculation Encroachment Foreigners Taking Over Resorts

Quantitative prioritization of these issues using indicators is quite difficult, given the wide variety of geographical and social parameters involved in each, and the problems inherent in providing values for those parameters. Therefore, it was decided that a comprehensive public participation process would provide the best, and most accepted, wetlands management plan.

The planning process included four stages and various substages. As the organization was established, with outreach to stakeholders and government officials, capacity building efforts contributed to the quality of participation. The value of capacity building can be seen in the production of a map (Figure 5.5.2) showing encroachment on the lakeshore, a result of a Map Reading and GIS training session.

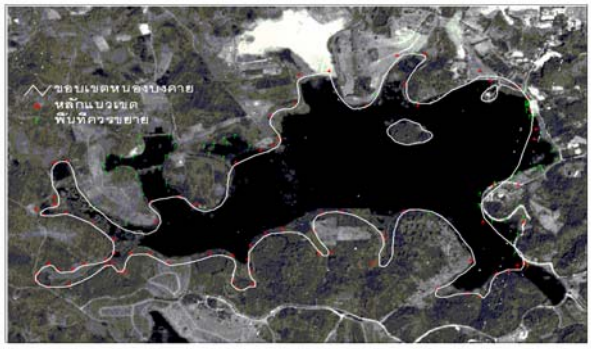
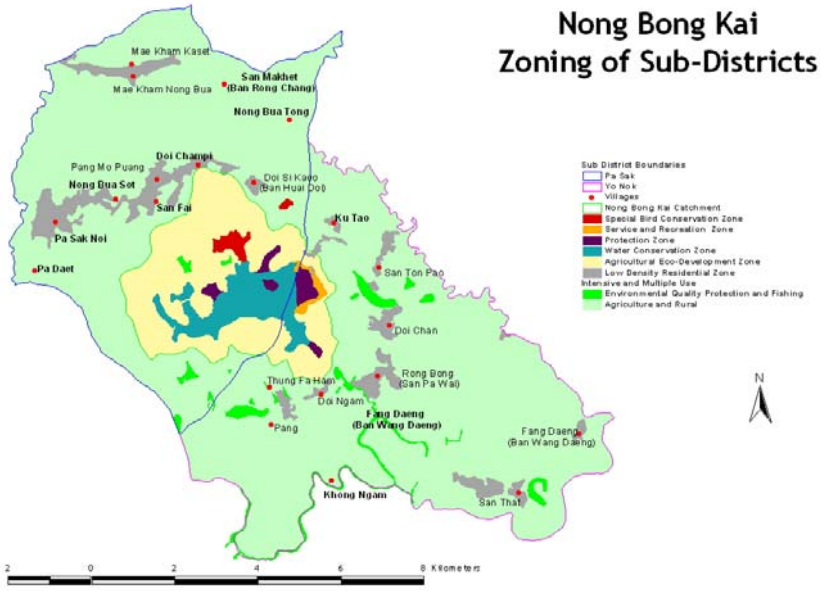


Figure 5.5.2
Map of Encroachment

As a result of this planning process, three main management zones were adopted, Figure 5.5.3. Furthermore, management intentions for each zone were also developed. Conflicts arose during the process, such as disputes between fishermen in the lake who want to retain water, and farmers downstream who need water released to irrigate their fields. Therefore, regulations or agreements were formulated to resolve conflicts of resource use among stakeholders.

The core wetlands area made up of the lake is reserved for long-term conservation, and a surrounding buffer allows limited activities that are consistent with conservation. The outer transition zone provides for intensive and sustainable use.

Figure 5.5.3 Nong Bong Kai Management Zones



The plan is now being implemented and monitored through the local initiative fund (MPW project), as well as local, provincial and national governments.

It should be noted that prioritization in a given ecosystem is only a means to a final outcome. In this case it is a management plan. Prioritization can be meaningfully conducted only when the objectives are clear to all stakeholders.

5.6 Conclusion

Most studies on prioritization rely on the indicator approach and expert judgment and are concentrated on issues and sectors. This is understandable because of the way the government agencies are organized and the availability of data. Public opinion and valuation method tend to put the forest sector at top priority followed by water resources (drought and floods). International funding agencies appeared to place water pollution at the top priority because of better infrastructural investment opportunities. From the basis of the available data, we are also of the opinion that forest and water sectors are the priority but as will be discussed in later sections, a large proportion of the Thai budget and a considerable amount of foreign agency assistance have already been concentrated in theses areas.

Probing more deeply as shown in Section 3, it is apparent that institutional fatigue seemed to be prevailing in all environmental sectors, i.e., institution for management and co-ordination exists, but implementation of these institutional rules is ineffective. This requires closer analysis of the environmental policy, mechanism and process of implementation, incentives for stakeholders, which are beyond the scope of this study.

6. Global Environmental Issues

Environmental problems are transboundary and many of them are of global concern. Mainstreaming global environmental issues is important both in terms of strengthening international cooperation and capacity building of the implementing agencies. So far, some global environmental problems, especially climate change, have received little attention both from the government and the general public despite its importance and the potential irreversible damage it may create regardless of geographical areas.

Mainstreaming global environmental issues have been made more difficult by the fact that many international environmental treaties are the outcome of the complex negotiation between the developed and developing countries. With the misconception and the debates dominated by academics and NGOs suspicious of the developed countries and the failure of the government agencies concerned to communicate to the public the benefits of multilateral environmental cooperation, Thailand has moved slowly in this area. One stark result is that Thailand is the 188th member of the CBD, about the last developing country to join the Convention. The same problem may be repeated with regard to Thailand's participation in the clean development mechanism under the Kyoto Protocol.

Since the Stockholm Conference on the Human Environment in 1972, environmental issues of global concern have received greater attention and several more international environmental treaties were concluded during the last three decades. Among the achievements made by the international community are the phasing out of the use of ozone depleting substances and the control of transboundary movement of hazardous wastes. After the Rio Conference on Environment and Development in 1992, combating climate change, and conservation and sustainable use of biodiversity have become big challenges for both developed and developing countries.

Thailand is a party to most of the global environmental treaties. In this section, we focus on those concerning the issues of climate change, biodiversity and transboundary movement of hazardous wastes. This is because they are the areas which generate most discussion at present as well as ones in which policies are still evolving.

6.1 Climate Change

Although climate change is only one of the problems concerning protection of the atmosphere, it has proved to be more difficult to tackle

than others due to the complexities of the interests involved and the uncertain adverse impact from climate change. Thailand has been relatively successful in implementing the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer and it is expected to phase out all uses of the controlled substances by 2010, which is the deadline set for developing countries. The policies for implementing mitigation measures under the Climate Change Convention and the Kyoto Protocol to the Convention have been less clear. However, the clean development mechanism under the Kyoto Protocol has caused the government agencies concerned to consider seriously what policies to adopt and the measures needed for implementing projects under the mechanism.

Thailand signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and ratified it in December 1994. The Convention is based on the principles of precautionary approach and common but differentiated responsibilities. In essence, this means action to prevent climate change must be taken even when there is scientific uncertainty as to the causes and the effects of climate change. In doing this, developed countries, which are emitting more greenhouse gases per capital plus the historical responsibility for their past polluting activities, must take the lead in combating climate change and its adverse effects. As a result, UNFCCC prescribes more obligations for the industrialized countries than for the developing countries. While all the parties including developing countries have general commitments, such as obligations to develop national inventories of anthropogenic emissions by sources and removal by sinks of greenhouse gases; to formulate national and regional programs containing measures to mitigate climate change; and to communicate or report to the Conference of the Parties (COP) information related to implementation, countries listed in Annex I, namely the OECD countries and the countries with economies in transition (the Eastern European countries) have further specific commitments to limit and reduce emission of greenhouse gases. In addition, only the OECD countries (Annex II countries) have the obligation to provide financial resources and technology transfer to assist developing country parties in implementing their obligations under the Convention.

However, UNFCCC failed to set clear targets and timetables for limiting and reducing greenhouse gas emissions. This was left for subsequent negotiation culminating in the conclusion of the Kyoto Protocol in 1997. The Kyoto Protocol entered into force on the 16th of February 2005. It prescribes specific targets and timetables for emission reduction of greenhouse gases by industrialized countries (the Annex I countries).

They are under the obligation to reduce the overall emissions of such gases by at least 5 per cent below the 1990 level in the commitment period from 2008 to 2012. This quantified amount is measured in term of anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A, which includes carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). Each Annex I party is required not to exceed their assigned amounts of aggregate anthropogenic carbon dioxide emissions calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B. For examples, the reduction commitments below 1990 level for some of the industrialized countries can be expressed in percentage as follows;

- The European Union, Switzerland and most other central and eastern European countries 8 %
- The United States 7%
- Canada, Japan, Hungary and Poland 6%
- Russian Federation, Ukraine and New Zealand 0%

In order to assist Annex I countries to comply with their obligations cost effectively, the Protocol provides for three flexibility mechanisms. These are

- *Joint implementation (JI)* of projects which allows Annex I countries to gain credits from financing emission reduction projects in other Annex I countries.
- *Emission trading (ET)* which allows Annex I countries to buy and sell credits among themselves for the purpose of fulfilling their commitments.
- *Clean development mechanism (CDM)* which allows Annex I countries to gain credits from financing emission reduction projects in countries not included in Annex I (the developing countries).

According to the Protocol, the purpose of the CDM is to assist non-Annex I countries to achieve sustainable development and to help Annex I countries achieve compliance with their quantified emission limitation and reduction commitments. Emission reductions resulting from each project activity will be certified by designated operational entities (DOE) under the Protocol. Annex I countries can then use the certified emission reductions (CERs) accruing from such project activities as credits for compliance with part of their reduction commitments. Emission reductions are certified on the basis that they must be additional to any that would occur in the absence of the certified project activity.

Participation in the CDM is voluntary and may involve private or public entities.

As a non-Annex I country, CDM is the only mechanism relevant to Thailand. Currently the Climate Change Coordinating Unit of ONEP is preparing draft guidelines which should provide some understanding of the likely strategy that the Thai government is likely to adopt. However, the proposed guidelines have yet to be approved by the Cabinet and there is apprehension that this is going to take some time due to the existing knowledge gap of decision makers. According to the Cabinet Resolution of the 10th of September, government agencies and state enterprises are required to give due attention to Thailand's obligation under the Kyoto Protocol by limiting greenhouse gas emissions. They should be primarily responsible for initiating and implementing projects relating to mitigating climate change. Any project operated with foreign assistance involving "carbon credits" must be submitted to the Cabinet for approval on a case by case basis.

The above Cabinet resolution reflects the Thai government's cautious approach towards the CDM although one would doubt whether the Resolution was based on the thorough understanding of how the CDM operates. According to a CDM strategy study financed by AusAID of the Australian Trust Fund through the World Bank to ONEP, CDM could be a new vehicle for foreign investments in projects that would not have been financed otherwise under Business as Usual commercial investment flows. With the low price for CERs in the global carbon market, the benefit for Thailand would not be in the total dollars realized, but the increase in the number of more technically advanced and sustainable projects across the country in several sectors.[2]

In 1998, emissions of carbon dioxide constituted 68 percent of total greenhouse gas emissions in Thailand, followed by methane and nitrous oxide with 27 percent and 5 percent of the total emissions respectively. The projected net emissions in CO_2 equivalent unit for the period 2000-2020 under the scenario of 4-5 percent of national growth rate reveals an approximately similar picture. The energy sector is the main contributor of greenhouse gas emissions, accounting for 51 percent of the total emissions, while the agriculture, forestry (land use and land use change), waste and industrial processes constitute a net CO_2 equivalent to 23 percent, 20 percent, 5 percent and 3.6 percent of total net national emissions respectively. The analysis of the emissions and projections makes it clear

[2] Ministry of Natural Resources and Environment, ***National Clean Development Mechanism: Strategy Study for the Kingdom of Thailand***, 2004.

that the most significant opportunities for CDM projects will likely be found in the energy sector.[3]

The CDM strategy study also lists the promising CDM projects for Thailand. They are projects in the following areas:

- Biomass renewable energy,
- Biogas renewable energy,
- Afforesting abandoned agricultural land and degraded forest
- Production process improvement in non-metallic and paper industries,
- Boiler feedwater system retrofit/steam pressure reduction/steam piping insulation/blow down system retrofit,
- Steam trap retrofit/boiler retrofit,
- Economiser for boiler/steam leakage reduction/condensate tank retrofit,
- Combustion efficiency improvement, and
- Chiller system retrofit.

For other sectors, such as the transport sector (e.g. fuels and vehicle technologies) and the agriculture sector (especially reduction of methane from rice cultivation), further research for potential CDM projects is recommended. In any case, it is obvious that CDM projects will have to be ones that investors find commercially viable with the small value of CERs making sufficient marginal differences for their decision to invest, although they may not necessarily be highest in their sustainable development attributes.

In July 2003, the Cabinet assigned MoNRE to act as Thailand's designated national authority for CDM (DNA CDM). Since September 2004, the Climate Change Coordinating Unit of ONEP has undertaken the task. The draft guidelines prepared by ONEP follow the CDM strategy study closely in their recommendation of potential CDM projects. The big remaining issues concern the following questions:

(1) Setting favorable national procedure for approval of CDM projects. Given that potential CDM projects are likely to be small, it may not be advisable to require Cabinet approval in every case. It is worth noting that the proposed procedure under ONEP's present draft guidelines involve multi-level decision-making, including consideration by the sub-committee on UNFCCC, the National Environment Board and the Cabinet. This long line of procedure can take up to six months for project

[3] *Ibid.*

approval, unnecessarily discouraging private investors with the increased transaction costs,

(2) Developing clear criteria for assessing whether proposed project activities assist in achieving sustainable development,

(3) Establishing institutions with sufficient knowledgeable personnel about CDM to handle project proposals and operate the whole CDM process,

(4) Enacting legislation to provide for property right in CERs to enable the selling of carbon credits,

(5) Adopting clear policies on how CERs are to be shared equitably among the investors, the project sponsors and the government,

(6) Determining types of CDM projects requiring environmental impact assessment in accordance with the laws governing EIA,

(7) Developing regulations to provide sufficient protection for business confidentiality, and

(8) Ensuring transparency and participation of stakeholders in projects potentially causing adverse environmental and social impacts.

The above is only a preliminary list of issues to be considered by the government if Thailand wishes to compete in the CDM markets. It is also of relevance to Annex I countries such as Japan which is one of the most likely sponsors for CDM projects in Thailand. In addition to fulfilling the specified institutional gaps, capacity building of the government agencies concerned, its personnel and the private sector in their knowledge of the climate change problems and the CDM process is important to allow CDM projects to operate successfully.

6.2 Conservation and Sustainable Use of Biodiversity

Biological diversity can be defined as the variability among living organisms from all sources, including diversity within species, between species and of ecosystems. These are often expressed as genetic diversity, species diversity and ecosystem diversity respectively. Although all would agree on the importance of biodiversity conservation, sustainable use of biodiversity is a controversial issue between the developed and developing countries. This is because use of biodiversity is important for the development of agriculture, modern medicine and biotechnologies. The genetic material in wild species contributes billions of dollars yearly to the world economy in the form of improved crop species, new drugs and medicines. While biodiversity is concentrated in tropical zones where developing countries are mostly located, capacity and the technology to

exploit biodiversity commercially belong to the developed countries. Questions of equitable benefit sharing and regulating access to genetic resources have been central to the debate on biodiversity during the last two decades.

As far as conservation of biodiversity is concerned, Thailand is a party to the 1971 Ramsar Convention on Wetlands of International Importance, the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage and the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Despite recent mounted efforts by the Thai government, the control of international illegal trade in wildlife transiting through Thailand continues to be a major concern.

More controversial is Thailand's ratification of the Convention on Biological Diversity or the CBD. CBD provides for *in-situ* and *ex-situ* conservation of biodiversity. It recognizes the sovereign right of states over their natural resources. According to the Convention, the authority to determine access to genetic resources rests with the national governments and is subject to national legislation. Access to genetic resources is subject to prior informed consent (PIC) of the countries providing such resources and where granted, it must be on mutually agreed terms. The parties must endeavor to create conditions to facilitate access to genetic resources for environmentally sound uses and not to impose unreasonable restrictions. Parties which are developed countries also have obligations to provide financial resources and technology transfer to enable developing country parties to implement the Convention. In addition, the parties must consider the need for and modalities of a protocol setting out appropriate procedures including ensuring advanced informed agreement (AIA) in the handling and use of living modified organisms (LMOs) resulting from biotechnology. This provision has led to the negotiation and adoption of the Cartagena Protocol on Biosafety in 2000.

Controversy and opposition to the CBD on the ground that the Convention might open the way to foreign access to local genetic resources has delayed Thailand's joining the CBD for 11 years. Thailand finally ratified the CBD in December 2003. The remaining task is to lay down the necessary institutional framework to regulate access to genetic resources and to achieve equitable benefit sharing from use of the country's genetic resources. Another hot issue is biosafety and the appropriate policy towards LMOs or GMOs (genetically modified organisms) as it is generally referred to in Thailand. Thailand is not a party to the Cartagena Protocol on Biosafety despite the obvious benefits of joining the Protocol.

At present, there is not yet one standard regulation governing access to genetic resources. In practice, several government agencies have jurisdiction over genetic resources depending on where they are located. For instance, according to the Plant Varieties Protection Act of 1999, access to all indigenous plant species in Thailand is subject to prior informed consent from the Department of Agricultural Extension of the Ministry of Agriculture and Cooperatives and an access agreement for equitable benefit sharing has to be negotiated. Where the relevant plant species is situated in national parks, there is another governing regulation on access issued by the Royal Forest Department (now the Department of National Parks, Wildlife and Plant Conservation) in 1992. The situation is one of overlapping responsibility and effective control over access would depend on a good coordination among the government agencies concerned. Besides, the Plant Species Protection Act does not cover genetic resources from animals. Nor could it deal with the problem of how to regulate and ensure equitable benefit sharing from use of genetic materials exchanged internationally between universities and research institutions in Thailand and those abroad.

As a matter of principle, there should be one national focal point to act as a clearing house for those seeking access. In 2000, the Prime Minister Office issued a regulation which set up a Committee on the Conservation and Use of Biodiversity (*Kor Or* Chor, hereafter referred to as the Biodiversity Committee). After the amendment to this regulation in July 2005, the committee is now chaired by the Minister of Natural Resources and Environment with the Director-General of ONEP being a member and the secretary to the committee. The Biodiversity Bureau (*Samnak Kwam Laklai Thang Chewaphap)* of ONEP is to act as the secretarial office to the committee. It has numerous functions, most of which concern coordinating with other government agencies on various matters including the conservation, research and development of biodiversity, biosafety, and negotiation of equitable benefit sharing access agreement. The Bureau has the power and duty to report to the committee any problem concerning the conservation and use of biodiversity and the matter must be submitted to the Prime Minister for a final decision.

The above infrastructure makes ONEP seem a suitable national focal point or clearing house for access to genetic resources. Currently, the Biodiversity Bureau is preparing a draft regulation of the Biodiversity Committee on procedure for access. The current draft requires persons seeking access to genetic resources to submit applications for access permits to the relevant government agencies. If proceeding in its present

form, the regulation would do little to alter the existing situation of overlapping responsibility and lack of standard requirements for negotiating access agreements.

On the issue of biosafety, the Thai government established a National Committee on Biotechnology Policies (hereafter referred to as the Biotechnology Committee) chaired by the Prime Minister in March 2003. A framework policy for national development of biotechnology for the period 2004 – 2011 has been prepared. It sets out 6 national objectives, namely using biotechnology for building modern bio-business, to make Thailand the world's kitchen, to create a healthy society with Thailand as the centre for health services in Asia, to achieve environmental improvement and enhance energy security, to contribute to building sufficiency economy, and development of human resources in biotechnology. Despite these ambitious objectives, there are many obstacles along the way. Among them is the lack of legally binding regulations governing biosafety which is important considering the strong public opposition to GMOs associated with biotechnology development. In August, 2004, the Biotechnology Committee adopted a policy on genetic engineering and biosafety which would allow the Thai society a choice on the use of GMOs meeting safety requirements for consumers and the environment. MoNRE has been assigned to work on an appropriate biosafety law and the task is currently undertaken by ONEP.

In conclusion, there are two main challenges relating to the management of biodiversity. First, there is an urgent need to establish internal procedure governing access to genetic resources and ensuring equitable sharing of benefit arising from the commercial use of genetic materials. Second, the government has to enact legislation or legally binding regulation on biosafety to facilitate biotechnology development. In all these issues, capacity building of organizations and personnel is needed.

6.3 Control of Transboundary Movements of Hazardous Wastes

Management of hazardous waste is another challenge to environmental management in Thailand. Thailand has a number of legislation regulating management of industrial waste but there is no specific law dealing with community or household hazardous waste at present. The national pollution management plan is clear in its promotion of the three Rs, namely reduce, reuse and recycle wastes. However, there

is no system in place to facilitate separation of waste and for systematic collection of discarded products which contain hazardous substances.

Relating to the policy on the management and recycling of hazardous waste is the policy on allowing import of wastes to support certain industries, including the recycling industry. Examples are plastic scraps which can be contaminated with hazardous substances, used computers and electrical and electronic equipment, cathode-ray and activated glass. Adopting appropriate policy and law on waste import requires a thorough study of the needs and reliance of industries on such raw materials. Of equal importance is the strict monitoring on how imported wastes are handled and used, as well as how residues from the use of wastes are disposed of.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal developed by UNEP in 1989 aims to reduce the transboundary movement of wastes from industrial countries for disposal in other countries, especially the developing countries. One of the principles behind the Convention is that hazardous wastes and other wastes should as far as possible be disposed of in the State where they are generated. Export of wastes requires consent in writing to the specific import from the State of import. The parties have obligations to provide the States concerned with information on a proposed transbounadary movements of hazardous wastes and other wastes and to state clearly the effects of the proposed movement on human health and the environment. Hazardous wastes must be packaged, labeled and transported in conformity with generally accepted and recognized international rules and standards. The State of export has a duty to take back the wastes when a transboundary movement of hazardous wastes to which consent has been given cannot be completed in accordance with the terms of the contract. Similarly, in the case of illegal traffic of hazardous wastes resulting from the conduct on the part of the exporter or generator, the State of export must ensure that the wastes are taken back into the State of export.

In an effort to strengthen control of transboundary movement of wastes, the Basel Convention was amended at the third Conference of the Parties (COP III) in 1995. The amendment imposes a strict ban on export of hazardous wastes and other wastes under the Basel Convention from OECD countries and Liechtenstein to other countries. In other words, the Amendment (generally referred to as the Ban Amendment) prohibits export of controlled wastes from developed to developing countries. To enter into force, the Ban Amendment requires ratifications from at least three-fourth of the States present and voting at COP III, or 62 States. As of June 2005,

58 States had ratified the Ban Amendment. Although the Amendment is not yet in force, the EU already imposed a ban on exporting wastes under the Basel convention from its member countries to developing countries.

As of July, 2005, the Basel Convention had 165 parties. Thailand acceded to the Convention in November 1997 but it has not acceded to the Ban Amendment. The decision whether or not to become a party to the Ban Amendment is related to the question of whether a complete ban on importing wastes from developed countries is appropriate to the economic development of the country. Although environmentalists and NGOs generally support a total ban on wastes import, making such decision without thorough study of the economic impact on certain industries could be unwise. It is worth noting that the Ban Amendment would not affect transboundary movements of wastes among the developing countries themselves, and thus importing wastes from countries outside the OECD is still possible. However, this has little effect on the present discussion since most imported wastes into Thailand are from developed countries including Japan.

On the assumption that importing of certain wastes is still necessary to supply raw materials for certain industries, it is desirable that Thailand should develop institution and law to provide for separation of wastes and systematic collection of community hazardous wastes. Such schemes can help to ensure certain amount of domestic supply of wastes used as raw materials or demanded by some industries, and to reduce the reliance on imported wastes which would inevitably leave discarded parts or residues for final disposal in the country. For instance, imported used electronic and electrical equipment is usually dismantled to extract precious metals from its circuits. The remaining parts are not usually properly disposed of. Establishing a collection system for hazardous wastes from used products will contribute to supporting certain industries, reducing imported wastes and ensuring that wastes are disposed of in an environmentally sound manner.

For this purpose, MoNRE is proposing a draft law on the management of hazardous wastes from used products. The law, if enacted, would impose a product charge on products which would become hazardous wastes when discarded by consumers. The revenue would then be used to set up a deposit-refund scheme as incentives for consumers to return waste products to collection centers operated by local governments in cooperation with MoNRE. Returned wastes would be managed in order to reuse and recycle the wastes as far as possible. The parts that

cannot be recycled would be treated and disposed in an environmentally sound manner.

It is recommended that a study on the industries including the recycle industries in Thailand be conducted to provide a clear picture on the needs and problems of these industries, types and sources of imported wastes and how these wastes are processed and disposed of finally. Such data is essential for determining an appropriate waste policy for Thailand.

7. International Collaboration on Environment in Thailand

There is a wide assortment of international environmental cooperation agencies in Thailand, and each has its own method of setting priorities in its programs. An examination of these, including advantages and disadvantages, will provide guidance on how JICA can best proceed with its own environmental program. Table 7.1 presents an overview of the number of projects and international cooperation agencies in Thailand.

Table 7.1 Environmental Funding: Sources, Programs, Amounts, Timeframes

Funder	Program	Amount (Million Baht)	Timeframe (Years)
DANIDA	28 Projects	1,925.0	4
UNDP	7 Projects	1,220.0	4
GTZ	8 Projects	960.0	6
USAID	4 Projects	1,066.0	2
CIDA	1 Project	284.0	7
SIDA	4 Projects	76.0	4

Sources: Interview results, JICA preliminary report. Conversion rates used are 41B/US$, 35B/C$, and 51 B/Euro.

7.1 Danish International Development Agency (DANIDA)

Environmental assistance from Denmark started in 1994 with DANCED (Danish Cooperation for Environment and Development). In 2002, a new Danish administration abolished DANCED and moved technical cooperation into DANIDA.

In 1996, DANCED was charged with providing assistance in the following areas: pollution prevention, sustainable energy use, and conservation with sustainable use of natural resources. This led to the adoption of several themes for environmental assistance, with each country receiving assistance in three or four of these: urban environment and industrialization, sustainable energy use, agriculture, water resources, forest and wood resources, biological diversity, and coastal resources.

In terms of prioritization, the Danish government established that the following factors should be considered: ***(1) higher priority for projects that assist countries in meeting obligations under international environmental***

conventions, (2) Danish resources (NGO's, private sector, and universities) should be actively involved, (3) information activities and public debate should be enhanced, (4) civil society should be involved, (5) sustainable energy should be a high priority, and (6) regional projects should also be higher priority.

In the beginning, Danish assistance in Thailand did not focus its efforts. Instead, following the priorities of the Thai government, it started projects in a wide variety of subjects and locations. Since then, DANIDA has focused its environmental work in Thailand into fewer subjects and projects as it has gained experience with (1) the environmental problems faced by Thailand, (2) the government agencies and NGO's responsible for protecting the various sectors of the environment and (3) the availability of the managers and the people in those agencies and NGO's who do the actual work. The last factor was emphasized as key to project implementation success.

This increased focus has evolved because DANIDA identified the areas that it felt most effective in addressing, and the people who were capable of undertaking their chosen projects successfully. DANIDA did not use any specific indicators or process to choose which projects and areas to focus on. However, long preparation times (one year or more) with frequent consultation and long-term experience with the personnel and subject area gave DANIDA the information necessary to chose which projects had a high likelihood of success.

The increased focus also means that DANIDA has fewer contacts to maintain, and those contacts are all high-quality. This results in both better communication with project officials, and easier management and oversight for those projects.

Two of the areas DANIDA has chosen to concentrate on are Urban Environment, specifically sustainable energy use, and Sustainable Agriculture through Integrated Pest Management (IPM). DANIDA claims that it chose the Urban/Energy area because (1) it had good experience in this area already, (2) their evaluation on environmental assistance to Southeast Asia showed that energy assistance was particularly successful, and (3) personnel in the Thai Ministry of Energy were knowledgeable and enthusiastic about working to change energy consumption in Thailand. The major thrust of DANIDA's project in this area is to boost the use of Biomass energy sources. DANIDA reports that this project will wind up in 2006.

With respect to Private Sector assistance, DANIDA stressed that finding both the right AGENCY and the right PERSON are key factors in

ensuring a successful project. The agency must be flexible enough to accept change, and as noted previously, the responsible person must be willing and able to move the project forward. Therefore, probing of these two factors is a key part of the long preparation cycle.

Furthermore, in moving the private sector toward environmental activities, DANIDA tries to ensure that Danish companies appropriately share their technology and knowledge with their Thai counterparts. A prime example of this is wastewater treatment. DANIDA provides funding for discussions, feasibility studies, market research, etc. However, this funding does not go through the Thai International Corporations Agency.

Another private sector area with DANIDA involvement is the Clean Development Mechanism (CDM) of the Kyoto Protocol on climate change. DANIDA is providing support to Thai companies to decrease their production of greenhouse gases, particularly in the sugar industry. DANIDA has organized workshops and has an in-house consultant on CDM, based on a similar project in Malaysia.

One of DANIDA's major contributions has been its involvement in the areas of forest resources and biodiversity conservation. The following example of project (WEFCOM) which has been completed was designed to enhance conservation in the Western Forest Complex, in western Thailand near Kanchanaburi.

(1) Western Forest Complex (WEFCOM)

As an example of using selection criteria to provide guidance in managing protected areas, we can look at efforts in Thailand's Western Forest Complex (WEFCOM), made up of 19,000 sq. km, including 11 National Parks and 6 Wildlife Sanctuaries, and home to 2500 plant species, 120 mammals, and 400 bird species.

The project involved the implementation of the Ecosystem Management Project in WEFCOM, a land use planning and ecological zoning process using rapid ecological assessment and public participation. The end result is a map of Ecological Management Zones covering WEFCOM. The principles involved in establishing the different zones are (1) protect native and unique ecosystems, (2) use spatial-ecological quality factors that are systematically collected, and (3) encourage multi-stakeholders to participate in the whole process of the zoning scheme. These stakeholders include Provincial Conservation Fora (PCF), Conservationists, Journalists, Protected Area Superintendents, the

Technical Advisory Committee, the Project Steering Committee, and NGO's.

The process for undertaking this zoning is as follows: First, in the rapid ecological assessment, data are collected about the location of unique or rare species, and this data is entered into an existing Geographical Information System (GIS) obtained from the Department of Environmental Quality Planning. Second, the different management zones are defined, along with criteria for assigning each geographical area to a particular zone. Third, spatial analysis involving a set of habitat models is undertaken. Fourth, consultation with experts and ground-truthing occur to ensure that each area is properly zoned. Finally, the zoning scheme is endorsed by the proper authorities. It is essential that each step includes public participation in order to assure that the public accepts and abides by the final results.

The rapid ecological assessment involves selecting several species and creating a computer model of their habitat in order to determine where they are likely to occur. Species are selected if they are wide-ranging, provide an indication of a certain ecological niche or are a flagship species, if they have significant conservation value, and if there is existing high-quality data on their ecological needs and range.

Once the species are chosen, a logistic regression model of their range is created, using data from known observations such as forest type, distance to streams, elevation, slope and aspect, and proximity to human development. This model is then used to predict the location of previously unknown populations, which are then checked for the species' existence. The models have proven remarkably accurate for large species like elephants, with 83 percent success. But again, the lack of data for some important but less charismatic species leaves many gaps for the entire ecosystem.

After the models are checked for accuracy, they are then used to create management zones (Figure 7.1). Areas that have a high probability of including rare or endangered species are set aside, with little or no human disturbance allowed. Areas with lower densities or rare species, or that are already close to human habitation, are given less protection and can be managed for extraction of resources.

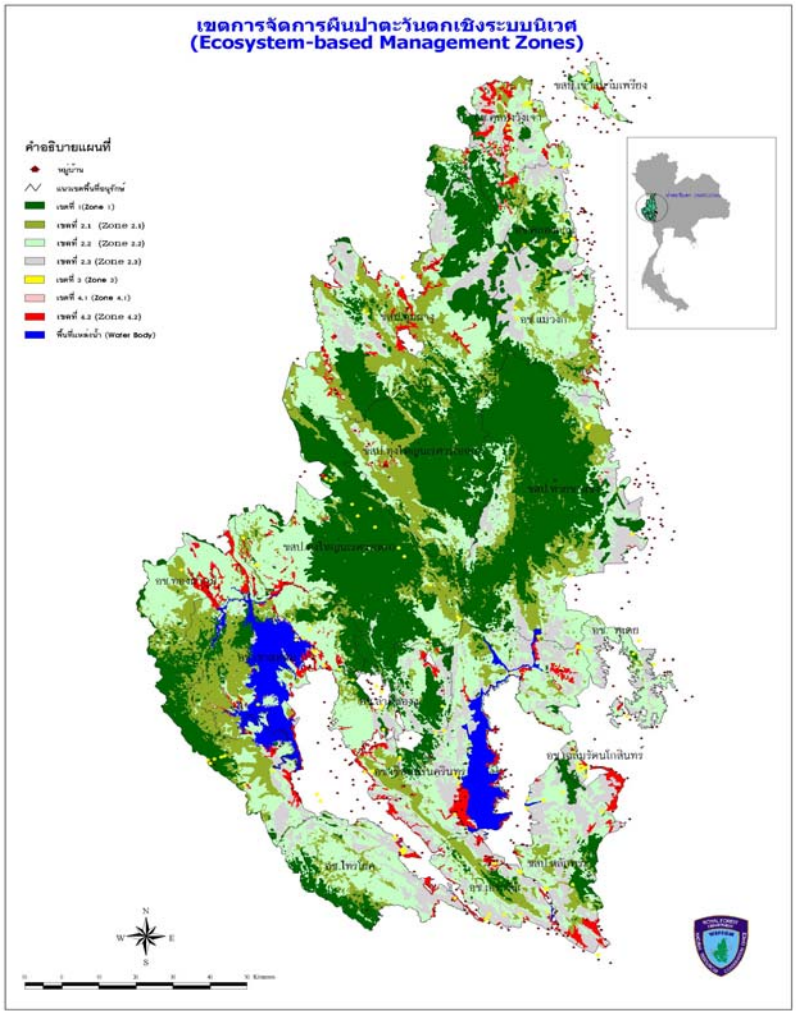


Figure 7.1 WEFCOM Ecosystem Management Zones

(2) Joint Management of Protected Areas (JoMPA)

The success of the WEFCOM project has led DANIDA to implement the Joint Management of Protected Areas (JoMPA) project. JoMPA has three aims: to use a participatory approach in managing Thailand's Protected Areas, it provides for the conservation of biodiversity while improving the livelihoods of local people, and increasing democratic involvement. In this light, main goals of the project are (1) effective management of protected areas with an ecosystem emphasis, and (2) ensuring that joint management is operational in a range of protected areas. From these, JoMPA will then create models and systems for joint management, and replicate these in other places. In order to do this, both human and institutional capacities must be developed.

For each protected area in JoMPA, an operational plan with effective zonation will be produced. The plan will provide for sustainable resource use, ecotourism development, and stakeholder involvement. The plan will be monitored for ecological and socioeconomic success. A major focus of JoMPA will, of course, be public participation and decentralization, based on the 1997 Thai Constitution and the Decentralization Act of 1999. It is hoped that bringing management of Protected Areas to a more local arena will provide more opportunities for public participation.

There is a wide variety of stakeholders in Protected Areas to be included in the JoMPA process. These include the Protected Area authorities, local communities both in and near PAs, local government authorities such as the Tambon Administration Organizations, Non-Governmental Organizations, and private sector actors who seek to use PA resources in profit-making enterprises. DANIDA is providing support to the Department of National Parks, Wildlife and Plant Conservation and the NGOs. However, NGOs are constrained to the role of facilitating cooperation between local communities and PA authorities, with the understanding that they will not undermine the credibility of those PA authorities.

Opportunities for success arise from the Thai government's intent to promote good governance and a participatory process, including decentralization. However, the project is constrained by the limited experience of Thai government agencies and officials, in joint management. Thai administration has historically taken a leadership with limited mechanisms for collaboration. Further, Thai commitment to this process may waver, in terms of money, staff and objectives.

Because the project has limited funding and time, prioritization of project activities involves consideration of the following: ***whether they supplement and/or assist other projects (particularly the JoMPA Sub-component) to make the ecosystem management more effective; high priority to the Natural World Heritage Site; developing sustainable management mechanisms or models for long term management based on an ecosystem approach.***

7.2 Swedish International Development Agency (SIDA)

The Swedish International Development Agency (SIDA) is represented in Southeast Asia by the Swedish Environmental Secretariat for Asia, known as SENSA. Currently, SENSA is withdrawing from Thailand

because PM Thaksin Shinawatra recently signaled a lesser need for further financial assistance. This withdrawal process was interrupted by the December 2004 tsunami, and provided the opportunity to continue some pre-existing projects. Thus, while SENSA continues to move away from financial assistance for Thailand, it continues to provide technical assistance in some areas.

Box 7.1: SIDA Environmental Aid Policy, Government Bill 2002/03/122

Sweden should seek to limit climate change, phase out toxic chemicals, and preserve biological diversity.

The pursuit of sustainable production and consumption patterns should be an important element of global development policy, and Sweden should assist the UN system in the preparation of a 10-year framework of relevant action programs.

Investments should be made in the development of environmental technologies and renewable energy in order to meet future global energy and transport needs.

Special attention should be paid to the connection between pollution, poverty, and conditions for women.

Measures should be taken to strengthen global implementation of international environmental conventions.

Sweden should urge relevant international institutions to further develop methods and analyze their environmental impacts.

Prior to the tsunami, SENSA had developed a Draft Strategy for Regional Cooperation, which focused on regional aid and small amounts of assistance to other SE Asian countries. While Indonesia and the Philippines were covered under this strategy, separate agreements were reached with Cambodia, Lao PDR and Vietnam. Thailand is included only within the regional cooperation program. Since the tsunami, ongoing technical projects, such as coral-reef monitoring and coastal assessments, have been extended, and some small new projects are being developed, but SENSA anticipates that these will end soon.

SENSA's management of Southeast Asian projects is diffuse. The Bangkok office manages some, but not all, projects in the region, which focus on environmental sustainability. Funding is small, providing assistance for organizations, networking, conferences, and the like. While

not essential, SENSA prefers to include a Swedish partner in these projects, whether corporate, academic, governmental, or NGO.

Four thematic areas are covered by SENSA's Southeast Asian regional strategy: ***Mekong River cooperation, illegal logging, agricultural chemicals, and waste management***. SENSA, partaking in some advocacy, has gone so far as to recommend that these areas be considered in the annual meeting of ASEAN's environmental ministers.

Thailand is included in this regional work because it is a member of regional organizations, such as the Mekong River Commission, with budget support coming from Stockholm. Through strategic consultations, SENSA has also promoted closer cooperation with China, providing a diplomatic mechanism to protecting Mekong resources.

While SENSA is reworking its programs, it seeks to move beyond these narrow thematic areas. There is significant funding for cooperation, but little for staff, so technical competence in thematic areas is not achievable. *SENSA is thus combining these thematic efforts into a sustainable development initiative. For example, agricultural chemical pollution raises issues of water quality, health hazards, and industrial pollution.* Thus the problem can be addressed in many ways. Further, the regional scope of the problem provides a wider scale for SENSA operations. It is stressed that *these efforts are not supply-driven, but are based on discussions with affected parties* and the availability of funding.

SENSA engages in the Greater Mekong Subregion work of the ADB through the Environmental Working Group. By joining this group, SENSA brings technical matters into the political discussions of Mekong management. SENSA sees its role as one that catalyzes the process, bringing people together, and allowing personnel in Stockholm to manage the projects through entities such as the Stockholm Environmental Institute which now has a branch in Bangkok. Thus, while the substance of SENSA aid programs is provided from the Bangkok office, the actual money is provided through Stockholm, through SIDA and the Swedish Ministry for Foreign Affairs. Prior to the Draft Strategy on Regional Cooperation, SIDA assessed its programmatic funding through an expert discussion and "morphological analysis," but current management believes that this analysis merely resulted in adoption of programs of interest to the meeting participants.

With respect to the Lao PDR, Swedish aid requires the accepting country to observe respect for human rights, but this has not affected aid to the Lao regime. Although the Lao PDR and Cambodia will both benefit from lessons of SIDA-Thai cooperation, the program should be sensitive to

historical, political, social and cultural issues that can cause divisions. Still, SENSA said that the Lao PDR could benefit in every area, including technical assistance, capacity building, and language training.

With regard to working with the Thai government, SENSA sees Thailand as a central node for Southeast Asian development, and would like to link with the Thailand Environment Institute. Despite the lack of direct contacts, SENSA is experimenting with a preliminary process in which Swedish agencies join with other organizations, academic and NGO, and forming a collaborative network which then engages with ASEAN. With this process, little money is actually invested, so losses are considered inconsequential.

One success story for SENSA involves the creation of legal frameworks for environmental protection in the Lao PDR and Vietnam. However, SENSA pointed out that environmental problems are not merely technical, but political as well, and require political solutions and the will and capacity to enforce legislation. Thus, while a legal framework is necessary to overcome environmental degradation, it is not sufficient, and political will and resources for monitoring and enforcement are also necessary. Authorities must be determined to overcome corruption, collusion and the impacts of economic growth.

SENSA is limited by its lack of staff, which numbers 2 in Bangkok. It cannot take requests for assistance, because it does not want to disappoint applicants. It plans to develop its new programs by the end of 2005, either through existing regional cooperation or the catalysis of new ideas. It plans to include a significant political dimension, including civil society and NGOs. In this vein, SENSA, allied with IUCN and the World Wildlife Fund, recently objected to the ASEAN Environment Ministerial meeting about the lack of civil society participation. Until ASEAN governments accept that public participation is required to solve environmental problems, little real progress will be made.

7.3 United Nations Development Program (UNDP)

UNDP currently has two program areas in Thailand concerning the environment, under the umbrella of the UNDP-Thailand Environmental Partnership (UTEP): Biodiversity Conservation and Renewable Energy. Both of these areas arise from selection criteria common to UNDP and the UN's Global Environment Facility (GEF), which provides community-based funding through its Small Grants Program. In addition, both areas are highly prioritized in Thailand: UTEP is working on

biodiversity in response to Thailand's ratification of the Convention on Biological Diversity in January 2004, and renewable energy was adopted by UNDP due to Thailand's stated goal of achieving 8 percent of their energy consumption to be from renewable by 2011. *It is this nexus between UN and Thai priorities that leads to the implementation of the two program areas.* Furthermore, both areas allow UNDP to focus on their core program of community-based initiatives aimed at poverty reduction through the UN's Millennium Development Goals.

These two program areas also share a goal for the UNDP's programme, that being the creation of a local knowledge center to allow Thai people access to the latest information on each area. With respect to renewable energy, there is no single Thai government agency responsible for gathering, storing and disseminating information, so information on best practices that reaches the government could be lost. This necessitates the need for a "knowledge hub." For biodiversity knowledge, UNDP envisions a coordinating body that would facilitate communication between local groups that have their own information, rather than a central site to store all information. Ownership of information is also to be avoided.

Both areas will also allow the development and demonstration of community-based initiatives. UTEP will implement a Joint Management Model on Community-based Natural Resources Management in selected ecosystems. For renewable energy, UTEP will create a Provincial Energy Plan with the Municipal Solid Waste Management in Surin Province. Both these projects will strengthen the capacity of local Thais in biodiversity conservation and renewable energy use.

UTEP works in a "Partnership Playground" that includes anyone willing to play by the established rules. From the policy sphere, this includes officials willing to engage in planning and implementation of policies, as well as regulation and enforcement, with an eye toward decentralization and local control. In the academic and NGO world, collecting and managing information and developing processes is essential as well as providing results and informing policy makers of those results. Communities can provide a realm for demonstration projects, provide the inspiration and labor for those projects, and disseminate the results as well.

A small amount of UNDP funding is used to leverage increased funding through the GEF's small grant program, originating from the European Commission. To receive funding for a local project, a community need not register as an NGO, it only needs to open a bank account in the project's name and be subject to an annual audit. One example of such a

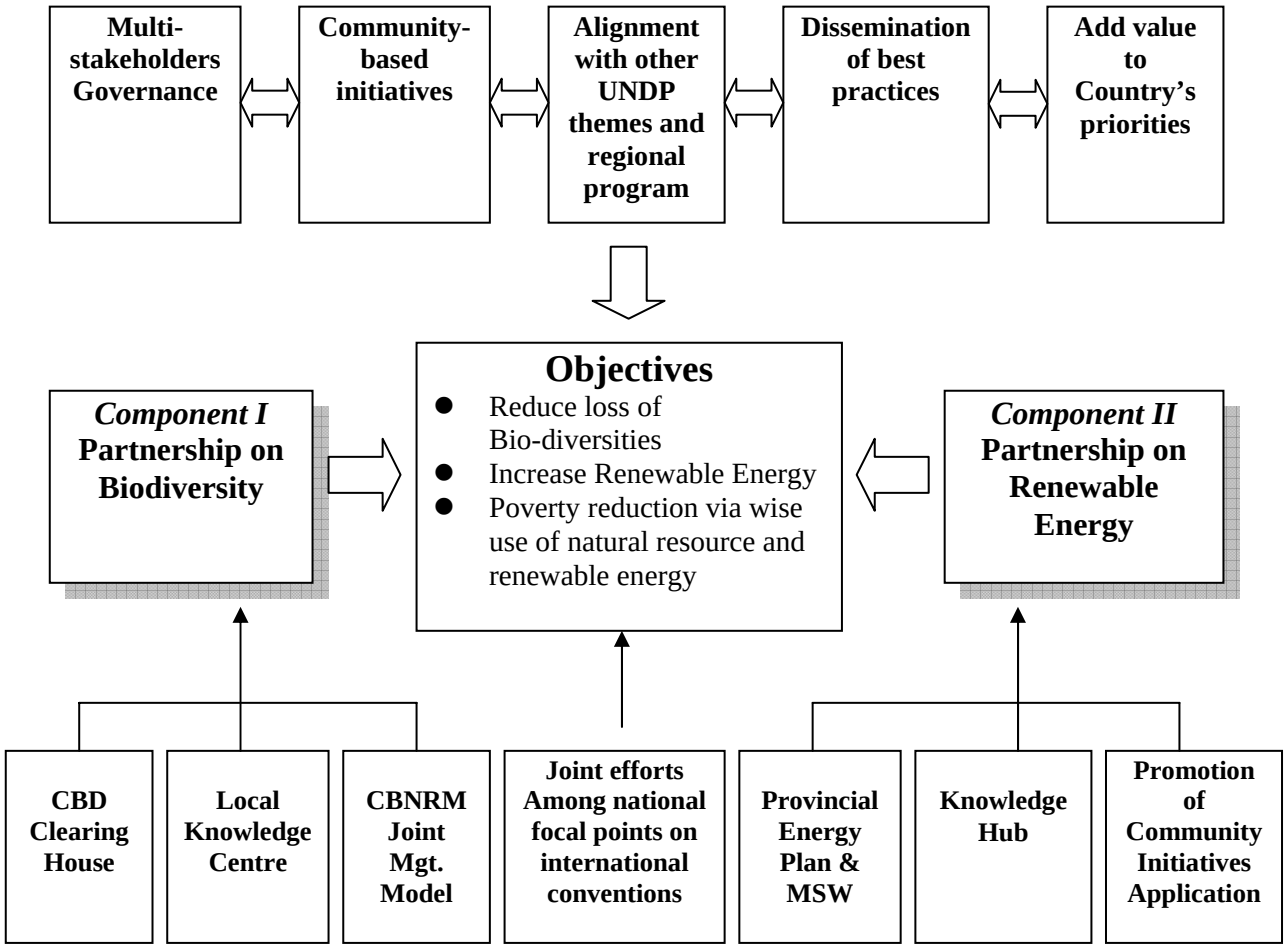
project is collection and storage of local seeds for cultivation. As many as 10 projects can receive up to $50,000 per year.

Currently, the UTEP's two-pronged program is in a preparatory phase. A capacity assessment is being undertaken on the appropriate international conventions: Biological Diversity, Climate Change, and Combating Desertification. Furthermore, a policy dialogue on municipal waste is ongoing in Surin, with a goal of converting waste into energy and producing a publication on community energy initiatives. UTEP is also reviewing IUCN's Red List of Endangered Species, and working on water governance in Songkhla Lake. UTEP believes these projects will move toward a reduction in the loss of biodiversity, increase renewable energy use, and reduce poverty.

Despite useful initiatives in the past and many success stories about Community Forests, the link between these field successes and policy formulation is yet to evolve.

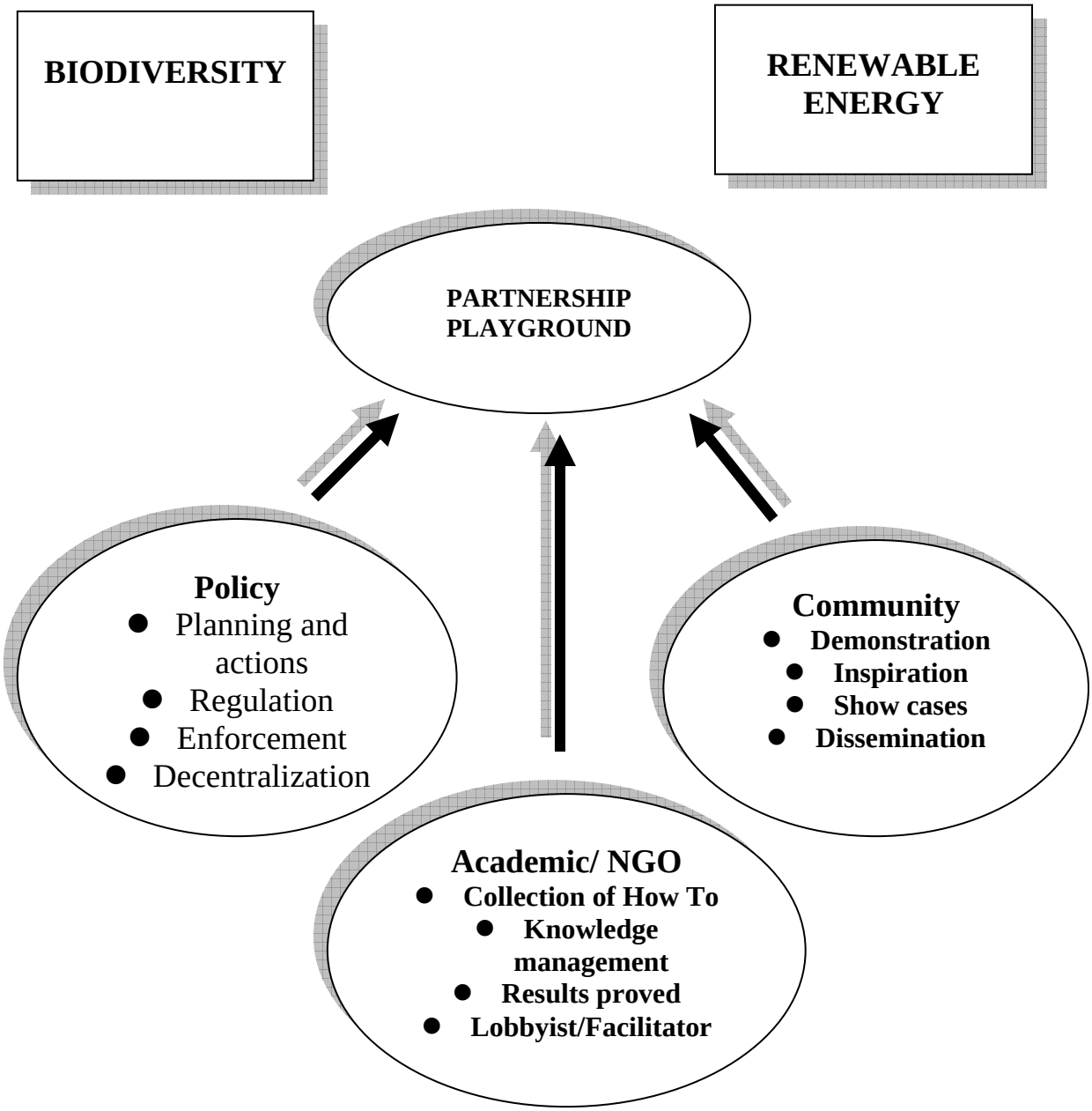
One possible angle is to get beyond the Donor-Recipient relationship, and create stronger relationships between International and Thai entities, operating together as true partners. This will require significant diplomacy. Working with local or provincial governments seems to be easier, but they often lack authority over National Protected Areas, which are centrally managed in Bangkok. Further, they generally have lower technical and managerial ability.

Figure 7.2 UNDP – Thailand Environment Partnership: Programme Design



Source: UNDP

Figure 7.3 UTEP PLAYGROUND



Source: UNDP

7.4 German Technical Cooperation (GTZ)

GTZ is a German government-owned development corporation tied to the Ministry for Economic Development. On the Thai side, several ministries are involved. Currently, GTZ's only environmental cooperation in Thailand comes under the Enterprise Competitiveness program, which seeks to improve the efficiency of Thai businesses, in particular small and medium sized enterprises (SMEs), which make up the backbone of the Thai economy. Of course, increasing efficiency also contributes to improved profits for the target companies, so GTZ's work can bring about a win-win situation for both Thai business and the environment.

In the agricultural sector, GTZ studies which products would benefit most from assistance. They determined that focusing on palm oil, aquaculture, tapioca, mulberry *(saa*) paper, and organic produce would provide a broad range of efforts, both geographically throughout Thailand and in terms of agricultural processes. By focusing on commodities, the efficiencies of the Thai's market economy could be brought to bear. The assistance sought to build capacity in risk management of hazardous materials in association with the Thai Industrial Estate Authority, and information systems for pollution management. While this work includes Thai government partners, it is not directed at government procedures; different stakeholders are important.

Other GTZ projects include environmental planning and municipal waste management in Phitsanulok. This project is currently expanding to other places, and will be finished in 2006. GTZ is also assisting with projects related to tsunami recovery, such as environmentally compatible rehabilitation and disaster prevention and control.

GTZ's budget for these projects is about US$17 million per year. Each project has multiple participants. For example, the Risk Management program includes 95 companies. However, GTZ uses a pragmatic model for its *governmental* dealings. Each project only includes one Thai ministry at a time, avoiding the problems of intra-governmental turf skirmishes. For example, one agency may be involved for 2 years, then is replaced with another agency for another 2-year period.

GTZ's work is only indirectly related to the UN's Millennium Development Goals (MDG). However, given the withdrawal of funding agencies from Thailand, GTZ seeks a new way to cooperate, i.e. an "entrance strategy" as opposed to an exit strategy. Thus, it sees its Thai programs as a partnership, rather than a hierarchical "donor-recipient" relationship.

7.5 The Canadian International Development Agency (CIDA)

CIDA is currently working in 25 countries, mostly in Africa, and is concentrating efforts on environmentally sustainable development. Like other donors, CIDA is currently changing its relationship with Thailand in light of PM Thaksin's policy that Thailand is graduating from LDC status. However, there are two areas in which CIDA has continuing programs: (1) Urban Environmental Management and (2) Climate Change.

The Southeast Asian Urban Environmental Management Applications project began as a partnership with the Asian Institute of Technology, and is regional in scope. It was highly prioritized because CIDA found that the most pressing environmental problems in Southeast Asia were in urban areas such as Bangkok, Kuala Lumpur, and Jakarta, and the explosive growth in urban areas is increasing the magnitude of these problems exponentially, especially in the health arena.

The Urban Management project includes all ASEAN countries except Brunei, and expansion to include China's Yunnan province is anticipated. Although CIDA's leadership is now waning, the program is continuing under the direction of AIT. The program focuses on air pollution, solid waste disposal, and water quality maintenance, and has moved beyond theory into the realm of application of processes and technologies that will actually improve the environment. One shortcoming that has been noted is the lack of information on air pollution.

There are three ongoing sub-projects of the urban management program: (1) demonstration projects throughout Southeast Asia, (2) a Joint Research Project, which provides funding on a competitive basis to AIT alumni for related projects, and scholarships for MS and PhD students at AIT, and (3) efforts to promote networking across borders. The total budget for this program is $10 million for six years. Monitoring by Thais is ongoing, and an annual report is issued by a Canadian contractor. A mid-term evaluation will be undertaken in 2006.

With respect to climate change, five years ago CIDA announced a $100 million fund available for developing countries applying for assistance to combat growing greenhouse gases emissions. Thailand's application was accepted, and the Thailand Cities for Climate Protection (CCP) Campaign was created. Programs in four cities (Ubon Ratchathani, Phuket, Rayong and Chiang Mai) are currently being implemented. Government officials from these provinces have attended international meetings in Mexico City and the Philippines, and partnerships with other cities around the world have been formed. These partnerships have

discussed mass transit, waste minimization, and recovery of recyclable and compostable materials from the waste stream.

It must be noted that as of April 1, 2006, CIDA's funding authority will be transferred to the Canadian Ministry for Foreign Affairs, and in the interim, new programs are under development focusing on conflict resolution in Thailand's three southernmost provinces. Because the conflicts in the region include land and resource use, these new programs may have an environmental aspect.

Box 7.2: CIDA Objectives and Approaches

Objectives for Environmental Sustainability

1. To increase the institutional, human resource and technological capacities of developing country governments, organizations and communities to plan and implement development policies, programs and activities that are environmentally sustainable.

2. To strengthen the capability of developing countries to contribute to the resolution of global and regional environmental problems, while meeting their development objectives.

Programming Approaches
for Environmentally Sustainable Development

To make substantial progress towards CIDA's objectives for environmental sustainability, three concepts will need to be better understood and applied in its programming.

1. The **ecological basis for development**, to recognize the productive potential and ecosystem limits to development in a given area;
2. The **economic value of the environment** and means for recognizing environmental values in economic decision-making;
3. The **relationships** among poverty, population dynamics, natural resource consumption and **environmental degradation**.

7.6 United States Agency for International Development (USAID)

The USAID office in Bangkok is a regional headquarters for Asia. USAID's global program has three Strategic Objectives: HIV/AIDS, Economic and Democratic development, and Environmental Protection. Thus, the Bangkok headquarters houses the Regional Environment Office (REO), whose Strategic Objective is improved environmental conditions in Asia.

The REO is the successor to USAID's Asia Environmental Partnership, currently being phased out. Like other funding agencies, the REO is changing its Thailand program from a donor-recipient relationship to a partnership, in response to PM Thaksin's statements that Thailand has achieved developed-nation status and would no longer accept foreign aid.

Of course, Thailand is often included in regional efforts. In any event, the REO remains results-oriented, with specific indicators being used to monitor success. The total budget is $26 million.

USAID performed a Pre-Assessment that considered **indicators in three areas: health, gender and economics**. As a result, **three issues** have been chosen as focus areas for the Bangkok REO: **Cleaner and Healthier Cities, Biodiversity Conservation, and Healthy Coastal Ecosystems and Communities.** One underlying issue for all of REO's programs, as well as those of USAID itself, is the implementation of **initiatives to improve governance, networking and cooperation, including public participation** in resource management. In this area, REO plays the role of a network facilitator, bringing together government officials from environmental agencies throughout the region to discuss their situations through for a like the Regional Network on Environmental Enforcement of Regulations.

The Clean Cities program contains two components: Clean Water and Sanitation for the Urban Poor, and Reduction in Diesel Emissions. In Thailand, USAID has partnered with MoNRE. Based on the chosen indicators, USAID determined that the Clean Water program should receive 80 percent of the funding in this area while the Diesel program gets the other 20 percent. However, at the Bangkok REO, the diesel funding was considered inconsequential when compared to that from other funders such as ADB, and was returned unspent. However, a small window of opportunity has been maintained to provide assistance for climate change, especially in China, based on technical expertise and sharing of knowledge.

Funding totals $4.5 million per year, including some good governance issues.

The Biodiversity Conservation Program, based on expert consultations, focuses on two areas: illegal trade of endangered species and creation of migration corridors for widely-ranging species. The illegal trade project includes WildAid, Traffic, WWF and IUCN as partners, with the Department of National Parks, Wildlife and Plant Conservation as the government partner. The program is based on PM Thaksin's statement that Thailand was willing to serve as a regional hub for the enforcement of international wildlife conventions at the World Conservation Congress in Bangkok in November, 2004.

The biodiversity corridors project is driven by ADB, and focuses on the Greater Mekong Subregion (GMS). With no exclusively Thai component, pilot projects are occurring in Vietnam, with an eye toward land use policy reform and sustainable financing of conservation programs. For example, funds are being sought to pay upstream users to undertake sustainable land practices to protect the water quality for downstream stakeholders.

The Coastal Ecosystem project resulted from the aftermath of December, 2004's tsunami. $3 million is being spent over two years, in association with MoNRE, to create participatory programs for survivors, including sustainable livelihoods such as aquaculture and mangrove restoration. Specific projects include nurseries for both catfish and mangrove trees, which will provide villagers with both more economic independence and a new source of income. Furthermore, the U.S. Government is providing $16.5 million over two years to create an Indian Ocean Early Warning System for tsunamis and other natural disasters.

Some successes for the REO's programs include improving processes for public participation and better service from municipal governments in Chiang Mai, Khon Kaen, Phuket and Rayong. These cities have each seen new collaborative riverfront projects undertaken, with significant public participation. Furthermore, the REO has been working to get local governments and industries to accept fees for wastewater disposal and treatment. This has been ably undertaken with a partnership with Portland, Oregon.

7.7 Conclusion

The expert or consultant approach is the most popular method used by international agencies to help them identify priority areas. Consultants are asked to review country situation and to interview local experts and come up with suggestions. Expert judgments can be made on the basis of indicators (the case of SEF II of the ADB, USAID). Some of the collaborative programs are regional (CIDA) and thus some priority areas, especially those related to global issues, are predetermined from donor countries. Since economic valuation method is relatively new, it has not been used as a prioritizing method.

When choosing cooperative projects, international agencies in Thailand seem to repeatedly emphasize a few noticeable criteria. First, the foreign country tends to seek projects in which it has a comparative advantage over other countries. For example, DANIDA emphasizes its century-long relationship with the forest sector of Thailand. Second, agencies like to connect environmental concerns with other development goals, such as health, gender, poverty or consumption issues. In addition, there is a tendency to link environmental and other issues to creating a forum for public participation. Furthermore, the foreign agencies look to issues with regional or national importance, and those that have clear or consistent policy targets. Finally, many agencies look to the economic impact to determine their partnerships. However, one of the most glaring omissions is on-the-ground monitoring for actual impacts to the environment – only the World Bank has any evidence that this occurs (Table 7.2).

Environmental cooperation in Thailand tends to cluster around three main substantive areas and one process-oriented area (Table 7.3). First, conservation of biodiversity is of high priority due to Thailand's tropical ecosystems, which are abundant with varied lifeforms, but face extreme threat levels due to the value of the resources and the lack of laws and/or credible enforcement. Second, many agencies focus on urban/industrial issues due to the impacts of Thailand's rapid transformation from an agricultural to an urban lifestyle. Third, the global impact of air quality issues linked to climate change has created a vast pool of international resources, and Thailand has taken advantage of these to promote its own efforts to diminish these effects. Finally, most if not all of the international cooperation agencies realize that Thailand lacks experience in environmental issues, and capacity building is a component of most of the collaborative programs.

Table 7.2 Criteria Used to Determine Environmental Cooperation in Thailand by Interviewed Agencies

Criteria/Agency	DANIDA	SIDA	UNDP	GTZ	CIDA	USAID
National Targets			X			
Regional Importance	X	X (Mekong)				
Comparative Advantage for Agency or country	X			X		
International Conventions	X (CDM)	X	X			
Relationship between environment and other social issues		X	X (MDG)		X	X
Involve public/ Civil Society	X		X			X

Source: Interview

Table 7.3 Environmental Cooperation in Thailand by Sector

Sector/Agency	DANIDA	SIDA	UNDP	GTZ	CIDA	USAID	Total
Forest/ Biodiversity	X	X	X			X	4
Climate Change	X				X		2
Energy	X		X				2
Agriculture	X	X					2
Urban/Industrial	X	X	X	X	X	X	6
Coastal Ecosystem		X				X	2

Source: Interview

8. Synthesis and Conclusion

8.1 Management gaps

The current management regime for issues in natural resources and environment has a number of gaps as follows.

(1) Linkages to local governments

In compliance with the 1997 Constitution, decentralization of the administrative power to local governments in Thailand began in 2000 when the decentralization plan was approved by the Cabinet and reported to the Parliament. Environmental management is one of the six areas that have been transferred to local governments.

At present there are 75 Provincial Administrative Organizations (PAO), 1,144 municipalities and 6,636 Tambon Administrative Organizations (TAO). Of the six areas that have been transferred to local governments, there are a total of 245 responsibilities. This means that local governments are faced with a greatly expanded burden and that urban environments and the quality of life of the Thai people are now in the hands of local governments. As a result, they usually started with infrastructural projects mostly road construction and improvements.

As mentioned earlier, MoNRE has a relatively large budget for protected areas which it has implementing arms i.e., the Department of National Parks, Wildlife and Plant Conservation and the Department of Coastal Resources, and relatively small budget for policy and planning(ONEP), pollution regulation (PCD) and for creating links (DEQP and Office of the Permanent Secretary) with local governments. The annual budget of the Department of Pollution Control in MoNRE is 300-400 million baht, slightly more than half of the income of Chiang Mai Municipality, or about 5 percent of the budget for the Department of National Parks, Wildlife and Plant Conservation and the Royal Forest Department combined. The annual budget of the Department of Environmental Quality Promotion is about 700 million baht, which is spent on both natural resources and environment. Although theoretically, DEQP should be the extension arm of MoNRE, its budget is used for many other purposes including public relations, new environmental initiatives and research and development.

As indicated in Section 4, the current budget for local governments is far short of the 35 percent of the total budget promised for 2006. Except for

larger municipalities like Chiang Mai, local governments lack skills, knowledge, experience and money to achieve their mandate. Furthermore, departments in MoNRE have provided haphazard guidance to local governments. Of agencies within MoNRE, only the Department of Groundwater Resources ensured a systematic transfer of responsibilities. Many responsibilities have only been transferred on paper without corresponding budgets or the transfer of skills and expertise. Although there are national guidelines indicating which responsibilities to transfer and when, there is not a concrete plan or supporting budget for the systematic transfer of environmental management to local governments.

MoNRE is represented at the provincial level by provincial MoNRE officers. These officers are mandated to assist local governments in all natural resources and environmental matters. Since many of the provincial officers were previously forest or sanitation officers, they do not have technical expertise in *urban* environmental issues, which are increasingly important in all provinces. Moreover, they are provided with a minimal budget for office expenses. More capable and experienced officers might be able to secure more funding through established networks, and hence engage in a wider range of activities. This is possible only if they can initiate projects and obtain additional funding from the provincial governor and the Provincial Administrative Organization. Regional officers oversee the provincial officers, and they must cope with the same situation. Neither of them are able to effectively transform national plans produced by ONEP into actual field practices. ONEP, being a planning and a non implementing arm has no budget to link with local governments. Given such limitations, there actually is no environmental extension service for local governments in Thailand.

(2) Sectoral Management

Our analyses of the causes of environmental degradation suggest that environmental problems need integrated management, as shown in the causal diagrams in Section 3. Unfortunately, environmental management in Thailand is sectoral or specialized. Each department has its own laws and oversees a particular resource, such as groundwater, surface water or irrigation water. Moreover, the Department of Land Development has a large budget for small water resources development. Watershed management is under the Department of National Parks, Wildlife, and Plant Conservation. This has resulted in overlapping mandates and services, as well as ineffective management. The government has tried to cluster

similar activities, and vested power for related departments under a deputy permanent secretary, but this has accentuated the specialization and sectoral effect. For example, under current restructuring, there may be Bureaus for water resources, soils and land, forests, and environment.

The Nong Bong Kai case study in Section 5.5 also shows another important weakness of the current sectoral approach. Wetlands outside the protected areas are under ONEP but ONEP is not an implementing agency. The management of wetlands is therefore under the local government authority, which lacks both technical and management capacity.

Attempts have also been made to initiate an area approach in the new budget reform process, forcing all departments to realign and co-ordinate their efforts on the same location. Examples include the Mae Ping River or Song Khla Lake Integrated Plans. However, until the incentive system and associated performance indicators are oriented towards an area-approach, it is likely that sectoral management will continue to dominate environmental management.

(3) Strengthening of Institutional Knowledge

While MoNRE has a large pool of well educated and informed public servants, it has not benefited from the amalgamation of their knowledge into a higher level of institutional knowledge. Neither has it established a system to create institutional memory of management successes. Several departments are new and the staff needs substantial retraining. Research is mostly undertaken to address short term or immediate problems. Many environmental problems are incremental and require long term monitoring, for example in the area of hazardous waste. Sharing of new knowledge is done through new recruitment and on the job training. At present, substantial training is focused on public service reform.

Institutional knowledge is important because it provides the impetus for new policies. In Thailand, an example of important institutional knowledge is the sponge effect of old-growth forests. This is the foundation of watershed protection, and has provided the famous public slogan “protect the forest for water.”

Today new research has revealed that the pump effect of forests (in which trees pump water from the ground to feed their growth) could be significant. Forest plantations (tree farms) and reforestation efforts consume more water than grass and some field crops. As a result, the South African government amended its Water Bill to charge water fees for tree

farms. It is true that the sponge effect is important while the forest is there, but for reforestation and afforestation, the pump effect may be more important.

The impact of reforestation on water may need to be evaluated, such as in Nan, Thailand's highest-yielding watershed in the Chao Phraya River system. Under the current regime, there is little opportunity for new knowledge (such as the pump effect) to be accepted into the relevant departments. This is especially important when Thailand is about to implement reforestation on a massive scale amidst increasingly frequent water shortages in the dry season.

There is a dire need to create a system where new knowledge or successful practices in the field can be presented to policy makers. Thailand does not lack success stories in environmental protection. There are many community irrigation systems and community forests. There are also many local governments that have innovated or managed their natural resources and environment successfully; prizes are given to them every year. Few of these have resulted in policy changes.

In MoNRE, there has always been an emphasis on creating a large electronic information system for policy decisions. The lack of funds is often cited as an obstacle, but the actual problem is the lack of processes for creating and strengthening institutional knowledge and the means to absorb new information. Better knowledge management is necessary, otherwise an information system to be created for MoNRE would be full of statistics, but lacks relevant information for better decisions. In MoNRE, there is much concern about the lack of systematic information system but there is little understanding of the need to have a knowledge bank which today could be conveniently stored either in the form of web-based manuals or web-based knowledge centers.

(4) Unbalanced reporting and ineffective public relations

Environmental management depends to a large extent on public participation to ensure environmental protection and conservation. Factual reporting of environmental issues and associated public relations efforts are important tools for informing the public, as well as stimulating public debate and activities. The current official reporting system is biased towards production of goods or services and income rather than the resulting environmental damage. Policy makers and executives prefer to announce increases in income or employment, without informing the public about the environmental tradeoff. Environmental news is often bad news,

and for political reasons is often delayed until the last minute. Although a state of the environment report is produced annually, it has limited circulation and there is little funding for greater publicity.

Moreover, environmental reports concentrate on problems without connection to human health or personal costs. This has resulted in unaesthetic environmental reporting. Substantial outlays are made for environmental public relations, but the information is mostly linear, simple and repetitive, relating to issues that urban residents have little means to understand or take responsibility for. Information that directly relates to urban polluters is rarely presented.

The above administrative gaps are not complete. There are others that either are being addressed (such as public participation), or gaps that are too political to involve a non-Thai agency (such as amending laws to provide for community forests, or land, and the forest and people issues).

(5) Global environmental issues

Section 6 presents a broad picture of global environmental issues that concern Thailand, and the challenges Thailand is facing in the areas of climate change, biodiversity and waste management. Of these three, the knowledge gap with respect to the Kyoto Protocol and the CDM is the biggest. Apprehension about the CDM is widespread among NGOs, the general public and even among academics. There is a general misconception that if Thailand participates in the CDM and sells carbon credits, this would affect the country's emissions quota and the carbon credits Thailand has in stock. The fact that Thailand does not have any emissions limitation or reduction commitments under the Kyoto Protocol at present, or that CDM projects would have no effect on the country's future commitments, is often overlooked.

As a matter of fact, the real issue is to develop appropriate criteria for selection of projects which would promote cleaner technology and satisfy the sustainable development goals of Thailand. As indicated previously, the most significant opportunities for CDM projects are likely to be found in the energy sector. The major benefits do not lie in the amount of foreign investment in CDM projects, but in the increase in the number of more technologically advanced projects which would not have occurred without the CDM. CDM projects have the potential to transfer technology as well as promote clean technology and energy-efficient economic development. Participation in the CDM offers an opportunity to strengthen the country's technological capacity to meet future greenhouse

gas limitations or reduction commitments. This may be required of some developing countries in the next round of negotiation under the Kyoto Protocol.

CDM is currently attracting a number of critics, most of whom focusing their opposition on reforestation projects. So far, there has been little discussion of possible CDM projects in the energy sector, although, those projects should receive priority consideration. Thailand is not obliged to participate in the CDM, but the country risks losing the opportunity to attract investment in clean technology if it does not move promptly. The CDM process has started, with the first commitment period beginning in 2008. It took Thailand 11 years to overcome the obstacles to join the CBD. In the case of the CDM, Thailand does not have that much time. There is an urgent need to fill in the knowledge gap at all levels, including decision-makers, personnel required for implementing the CDM process, private investors and the general public. This is required before the institutional and legal issues relevant for the operation of CDM projects can be addressed.

As an Annex I country under the UNFCCC and the Kyoto Protocol, Japan is a significant potential sponsor of CDM projects in Thailand. With its experience in the world's carbon market and its advanced technology, Japan has much to offer in helping to fill in the knowledge gap concerning CDM in Thailand. The priority should be to enhance and strengthen capacity of organizations and personnel in order to achieve an effective CDM implementation in Thailand.

8.2 Supportive factors

Despite the management gaps mentioned, there are a number of factors that could assist better environmental administration. First, the Thai government is undertaking the public service reform which stresses a citizen focus and an output/ outcome orientation. The reform package also makes public participation mandatory. Thus the public service reform is providing a good foundation for environmental governance. Second, the country can benefit from the strength of local universities, NGOs and local civil societies. Thai universities have strong environmental faculties, and over 300 NGOs have registered with MoNRE. Together, they are instrumental in implementing environmental protection projects, and have collected many success stories in environmental management. Lastly, Thai ministries are preparing to become e-ministries: they will be creating electronic information and knowledge storage capacity. Future Thai-Japan

collaboration efforts could consider including these factors in future project formulation.

8.3 Strategies for mainstreaming environmental issues

The previous sections have shown that environmental issues have not received much policy attention, but are perceived as a very important issue in Thailand both by the public and by the government executives. There are several reasons why the top executives in Thailand have not been interested in environmental issues. First, there are other more urgent social issues such as amphetamines. Although environmental issues were listed as the second most important after amphetamines (as shown in one citizen survey), it was a very distant second. Second, providing the remedies for environmental problems are more difficult and the outcomes less apparent, while the remedies for other problems are more easily and readily discernable to the public. Third, environmental issues tend to be localized and do not respond to a one-size-fit-all command. Each location and its set of problems require different solutions. Therefore, environmental management is more demanding. A populist government will choose to tackle an issue that is better understood by the public.

There are also various reasons why the public has not made a discernable demand to politicians on environmental issues. These reasons are similar to those mentioned earlier under prioritization. First, as mentioned before, environmental impacts are incremental and cumulative. It takes a long time before the public realizes the problem, often until it is almost too late. Second, environmental issues are varied, diverse and spatially related. What is important in one locality may not be important in another. Therefore, it is often difficult to gather affected stakeholders at a large enough scale to attract attention from the administrators. Third, the culprits are sometimes difficult to identify, such as overuse of agricultural chemicals, or when the affected are also users themselves. In addition the impact from each source of pollution could be small (i.e. motorcycles) but together they could make a large impact and the transaction and political costs of gathering the transgressors for punishment are high. Therefore environmental complaint statistics have an inherent downward bias.

Under the populist regime, mainstreaming environmental issues can be useful to correct or reverse the degradation trends. This would work in the public arena, not only for policy makers or the executives. When the public demands environmental improvements, the populist government will start to put environmental goals in its agenda.

The strategy that would mainstream environmental issues is the same as the strategy of public communication about environmental values. This would be to gather the informed public and concerned citizens into a movement for environmental protection. Measures under this strategy would include:

- support for environmental alliances that include multiple stakeholders concerned about the environment. The key here is multiple stakeholders, because a single group of stakeholders tends to have one interest. In a multi stakeholder forum, individual interests would be cancelled or nullified. There could be different levels of alliances, e.g. at the national level, the provincial level, catchment/ river basin level, Tambon level or intervarsity level. The environmental issues that these alliances work on would be relevant to their own need and expertise,

- means for these alliances to collect, assemble, and analyze environmental problems in their own ecosystems, to do research which show links between environmental problems and health or the cost of environmental damages,

- fora and other communication channels, including distant and mass media, for these alliances to operate and disseminate information to the wider public, and

- strengthening existing environmental public relations activities so that the information disseminated would reach the public in a more user-friendly form and more relevant to their immediate interests (see Box 8.3.1).

- providing opportunities for non-government entities to conduct environmental public relations as government agencies may be reluctant to reveal bad news (see Box 8.3.1).

- support for a knowledge hub of best practices accessible to local governments, NGOs, academia, and concerned citizens.

Box 8.3.1

Examples of information that can impact the perception of environmental issues are listed below.

- Increased exposure to air pollution has resulted in higher frequency of illness and subsequent increase in medical expenditure. According to a World Bank Report, almost 20 percent of income in Thailand goes toward environment-related health problems.(World Bank 2000)

- Air pollution causes early deaths.
  - Air pollution is responsible for 310,000 premature deaths in Europe each year. Each European takes on average half a day off a year due to illness linked to air pollution costing the economy more than 80billion euros. (BBC 08/08/2005, http://newsvote. bbc.co.uk/mpapps/pagetools/print/news.bbc.uk/1/hi/hea).

- Heavy traffic is not only bad for your mood but is also bad for your heart.
  - Heart attacks were 2.6 times more common for people stuck in cars, 3.1 times higher for people taking public transportation (BBC 08/082005, http://newsvote.bbc.co.uk/mpapps/pagetools/ print/news.bbc.uk/1/hi/hea).

- Traffic damages male fertility
  - A research study in the University of Naples demonstrates that continuous exposure to traffic pollutants impairs sperm quality in young and middle-aged men (BBC08/08/2005, http://newsvote. bbc.co.uk/mpapps/pagetools/print/news.bbc.uk/1/hi/hea)

- More than ten percent of household income is spent on safe drinking water in the urban areas.(World Bank 2000)

8.4 Criteria for selecting priority areas

The criteria for selecting priority areas are given below. It should be noted that the criteria do not include severity or urgency of the problems because that consideration would be best handled by the Thai government.

(1) Cross sectoral linkage.

The priority areas should be the areas that benefit more than one resource sector or is supportive to other national goals such as competitiveness or poverty alleviation. Viewed from this aspect, the priority areas need not be in a resource sector, but could be a factor which cuts across all sectors such as management capacity or good governance.

(2) Linking best practices to policy or mainstreaming environmental importance.

The priority areas should be where a set of best practices is already available. This provides some potential for further development and a useful head start. In Thailand, areas with best practices have tended to concentrate on community forest managements. Recently, there have been many prizes given to local governments, so many examples of best practices have started to emerge.

(3) Support for new environmental initiatives and strengthening institutional knowledge on global issues

The priority project should support transmission of new ideas, new knowledge from research results (such as about global warming, clean development mechanism, and green GDP etc.), and existing international good practices (such as monitoring and treatment of hazardous wastes) as well as synergies of ideas (with a scale from universal to local). Global issues are a good niche for Japan because they are new issues in Thailand while Japan has more experience and technical skills. This criterion also implies the inclusion of multiple stakeholders because diversity in ideas generally arise from multiple sources with diverse backgrounds.

(4) Focusing on fragile ecosystems and environmentally distressed areas

If a site is to be selected, sites including wetlands and rural environments subject to industrial environmental stress are recommended because these are where management knowledge and capacity are the weakest.

(5) Commitment of local counterparts

Commitment of local counterparts could be seen in the form of matching resources, allocation of capable, high quality, and committed personnel, or showing a high probability of turning project results into mainstream policy.

8.5 Identification of priority areas

Three priority areas are recommended as niches for Thailand-Japan collaboration. Although deforestation and water pollution have been identified as the most important environmental issues by various agencies, these issues have already received substantial local financing and international support and are not recommended by this study.

(1) Strengthening local capacity in environmental management

As we have already indicated in Section 3, local governments are the actual actors in implementing environmental management. However, their capacities are relatively weak and they need support in both the technical and managerial domains (See also Section 8.1, item (1)). Moreover, urban and peri-urban areas are growing rapidly in terms of population but this phenomenon has not been accompanied by improved infrastructure or management capacities. Local governments in peri-urban areas are unable to cope with sudden demand for living quarters or the environmental stresses that follow. For example, the Tambon Administrative Organization of Khan Ham, Ayudhaya province, has about 4,000 residents, but must cope with a rapid increase in population, which has grown 10 times bigger within a few years after the establishment of industrial works very close to Bangkok (personnel communication Dr. Utis Kaothien 2005). Small local governments already finding it difficult to deal with urban pollution and

solid wastes may also have to encounter hazardous and industrial wastes from industry.

While managerial capacity and governance is the key to success in environmental protection in Thailand, the extension arm of MoNRE in the provinces is severely constrained both in terms of budget and personnel. Thus, providing support to link MoNRE and local governments meets all our criteria if local governments with wetlands areas or industrial stress are to be selected.

It is recommended that JICA could

1) support an environmental extension system for local governments,
2) improve management capacity and governance of local governments in Thailand,
3) provide a forum for exchanging best practices in environmental management among local governments, and
4) provide support for linking local governments to supportive institutions and civil society both locally and internationally.

Possible activities may include:

1) Survey of environmental status at the local government level,
2) Establishment of a mechanism for an environmental extension system,
3) Training of local government personnel and local authorities staff of MoNRE,
4) Establishment of an environmental league/network for local governments interested in improving environmental management, as well as support of network activities to be organized by local authorities of MoNRE,
5) Joint environmental plans and implementation of the plans for local governments in the same ecosystems, for examples, wetlands, and highland watersheds,
6) Joint management plans and implementation of solid wastes or hazardous wastes exchange centers and so on, and
7) Seminars and study tours on best practices.

(2) Pollution and hazardous wastes management.

In the last decade, Thailand has rapidly moved from an agricultural

base to manufacturing-based activities. The fraction of the labour force in agriculture fell drastically from 63 percent in 1990 to 42 percent in 2004. Manufacturing industries have shifted from mechanical-based to chemical-based production. Correspondingly, imports of chemicals have increased. At the same time manufacturing activities have moved out of Bangkok not only to the Eastern Seaboard, but also to the peri-urban and rural areas in Ayudhya, Nakhon Ratchasima, and the industrial estate in Lamphun province. Since the 90s, the agricultural work force among the 15-25 years age group has steadily contracted, leaving only the middle aged, the elderly and children in the rural areas.

In a recent study supported by a JICA expert, Mr. Munihiro Fukuda and the New Industrial Technology and Energy Development Organization (NEDO) reported evidence that the use of hazardous substances without appropriate management has resulted in the contamination of soil and could lead to the contamination of the groundwater in the long term. This includes the use of chlorinated ethylene to clean electronics and electrical appliances, metals, and jewelry, which is likely to become a significant environmental problem in Thailand (Meesak and Phitsamai et al 2001). Chlorinated ethylene is a solvent and the common substances under this group are tetrachloroethyene (PCE) and trichloroethylene (TCE). Human intake of PCE and TCE increases the probability of cancer. Therefore it is important that some precautionary action should be undertaken to prevent further pollution.

The growth of personal income and consumerism have combined to stimulate the expansion of durable goods consumption such as electrical and electronic appliances, adding greater problems to solid waste management. As an exporting country, Thailand is likely to face the extended producers' requirements of the developed countries in the future. These examples are adequate to suggest that pollution and hazardous waste management should become a priority area for Thailand-Japan collaboration, combining Thailand's need and Japan's technical expertise.

This issue meets criteria number 1 as pollution control is closely related to health, poverty and competitiveness policy. There is also a need for a stronger role for local governments, and the central ministries. There are also best practices available related to hazardous pollution control by local governments, and the issue allows linkage to the Basel convention.

It is recommended that Thailand-Japan collaboration could be directed towards increasing the understanding, knowledge and skill in managing urban and industrial hazardous wastes in Thailand, as well as

supporting capacity-building for MoNRE staff in monitoring hazardous wastes in major industrial estates in Thailand.

Possible activities may include: 1) providing technical assistance related to hazardous wastes management and monitoring to PCD, MoNRE's local authorities and local governments, and 2) technical assistance in establishing hazardous wastes standards and monitoring centers

(3) Mainstreaming global environmental issues, with particular emphasis on CDM

Of the three groups of global issues with evolving policies, biodiversity has received substantial support from various international agencies and relatively large budget from the Thai government. Moreover, the areas of forest and biodiversity conservation are not ones of special strength in Japan. In the past, Japan's cooperation with Thailand has been in the field of plantations rather than biodiversity.

Global issues meet our selection criteria number one of cross sectoral linkage, and criteria number three of promoting new knowledge and mainstreaming environmental issues. CDM management in particular could be considered as a five benefits strategy for Thailand. First, it encourages cleaner technology and therefore less future pollution. Second, it promotes technology and skill transfer. Third, it may attract more foreign investment. Fourth, it could enhance greater competitiveness as more viable CDM projects are likely to be in the energy sector. Finally, it would create additional income, although the sales of CERs may not be very large. Together, these five benefits could contribute to sustainable development. Japan has a particular strength in this area because it is one of the world 's most efficient energy users and the largest buyer of carbon credits.

Mainstreaming global issues could be conducted at all levels of stakeholders. This could be done by

1) supporting research related to local and trans-border environmental impacts on health, environmental costs and global environmental issues,
2) supporting environmental fora and exchanges of best practices both locally and internationally,
3) supporting public relation activities related to global environmental issues, and

4) strengthening MoNRE's capacity related to global environmental issues,

Possible activities could include:

1) Research related to environmental impacts on health, environmental costs and global environmental issues,
2) Environmental forum on transboundary issues for concerned citizens at the provincial level,
3) Training of officials of government agencies who are responsible for global environmental issues in negotiation, and dissemination of information about global environmental issues to the public,
4) Support for NGOs and universities to conduct campaigns on trans-border environmental issues,
5) Providing matching funds for the private sector environmental initiatives on CDM,
6) Supporting exchanges of environment youth volunteers between Thailand and Japan on global issue initiatives,
7) Providing scientific research funding on new or complex global environmental issues to establish new institutional knowledge,
8) Support for knowledge hubs on global environmental issues and new environmental initiatives, and providing assistance in linking knowledge hubs,
9) Assistance in the design and implementation of knowledge banks on global issues and web-based information retrievable system, and
10) Extension of knowledge bank services through distant electronic communication services in the Mekong subregion.

Annex I

In order to preserve the text of the original versions, the text in the following table is not edited.

Table 1 Calculation of the index for each indicator, dimension and the calculation of the composite index.

Dimension of development and indicator	Calculating criteria
Economic dimension	
▪ **Quality development** Total Factor Productivity (TFP)	Compare with the changing rate of the TFP in the past, the minimum point is -0.5 percent and the maximum point is 5.0 percent. If the development results in a 5.0 expansion rate this indicator will receive 100 points. If the expansion rate is -0.5 percent this indicator will receive 60 points.
Ratio of energy consumption to GDP	The ratio of energy consumption to GDP of the year 2000 which was at the lowest at 0.31. This was set as the goal for 100 points.
The consumption of renewable energy	Set the goal of renewable energy at 28 percent of total energy. The points received in each year are calculated from the achievement of this goal.
Rate of waste recycling in all communities	Set the goal of recycling waste at 30 percent of all waste generated. The points received in each year are calculated from the achievement of this goal.
▪ **Stable development** Total unemployment rate	The suitable unemployment rate is 2 percent. If the unemployment rate is 2 percent or below this indicator will receive 100 points.
Ratio of public debt to GDP	Target of public debt to GDP of 30 percent. The lowest point of 70 percent is considered having no

Dimension of development and indicator	Calculating criteria
	sustainability. The score is varied between the highest and the lowest points. If the score is beyond the set level, the highest and the lowest points will be used instead.
Ratio of current account to GDP	Good ratio of current account to GDP is between 4 to 4 percent of the GDP. If the current account is -4 or higher, this indicator received 60 points. It will receive 100 points if the current account is at 4 percent. However, the point will decrease if the account is greater than 4 reaching the 60 points again if the account is at 12 percent.
▪ **Wealth distribution** Gini coefficient of income distribution	Good Gini coefficient of income distribution is 0.40. If the Gini coefficient is at the goal, the indicator will receive 100 points.
Achievement in poverty reduction	The Eighth National Social and Economic Development Plan set the goal of poverty reduction to 10 percent. The indicator will receive 100 points if the poverty rate reaches this goal.
Social dimension	
▪ **Capacity building** Average years of education	The Ninth National Social and Economic Development Plan set the minimum years of education at 9 years. The points received are calculated from the achievement of such goal.
Achievement in education	Transform the test result of 100 point base to the achievement of the development using 100 points as goal.
▪ **Improvement of quality of life** Life expectancy at birth	The expected average age is 80 years and the lowest

Dimension of development and indicator	Calculating criteria
	tolerable average age is 25 years. If the average age of Thai people is 80, this indicator will receive 100 points.
Human Health	Calculate from healthy (non-sick) population from the total population with the goal of 100 percent healthy.
Life security	Calculate from the average ratio of cases occurred per year per 1,000 persons comparing with the lowest ratio of cases occurred as the goal. The lowest ratio of crime cases is 1.2 cases per 1,000 persons and the lowest ratio of drug cases is 1.8 per 1,000 persons.
▪ **Creating equality and participation** Participation index	Calculate from the rate of people using their rights to vote with the goal set at 100 percent.
Corruption index	Calculate from the Belief in Corruption Ranking result by the Transparency International (TI) with the highest point = 1.
Environmental dimension	
▪ **Conservation** Proportion of forest area to nation's area	According the standard set by the forest experts and scholars that at least 40 percent of the land area must be forest to maintain the balance in ecosystem. If the forest area is 40 percent of the nation's area, it will receive 100 points.
Proportion of the current mangrove forest area to the 1961 mangrove forest area	The goal is 80 percent of the mangrove forest area in the pat (1961) which was abundant at 2.4 million rais. If the area is 1.84 million rais, it will receive 100 points.

Dimension of development and indicator	Calculating criteria
Amount of economic marine livestock caught within 3 kilometers of the Thai coast	The goal of catching economic marine livestock is 100 kilogram in 1 hour. If the marine livestock is abundant to the catching limit, it will receive 100 points.
The use of ground water to the available amount	The goal of the amount of useable ground water is between 20-160 percent. If the ground water is used less than 20 percent, the score received is 100 but if is used more than 160 percent, the score is 100. ***Note*** at present, there are only 7 provinces in the central region with data on ground water consumption.
▪ **Good environmental quality** Proportion of good quality water resources to all water resources	Calculate the proportion of good quality water resources to the total water resources with the goal of 100 percent.
Air quality in major urban areas that is below standard	Percentage of the air quality monitoring stations that reports low air quality (measure for particles smaller than 10 micron) with the goal set at 100 percent report good air quality.
Properly treated hazardous waste	The goal of properly treated hazardous waste is 50 percent of all hazardous waste in year 2006.

Source: TEI and Kenan Institute of Asia2004 (English executive summary) pp E12-E15 .

Annex II

Table 1 Public opinion : The most critical social problem that action should be taken immediately in Thai society

Unit : Percent

Social Characteristics	Amphe-tamine	Environ-ment (pollution, waste etc.)	Crime	Natural resource depletion	Prostitu-tion	Traffic conges-tion	Others ex. corrupt-tion	Social and economic problem ex. poverty	Not reply	Total
Total	**66.30**	**11.50**	**8.50**	**4.70**	**3.40**	**2.90**	**2.30**	**0.30**	**0.10**	**100.00**
Area of sample										
Central	66.32	8.42	5.79	4.74	7.89	4.21	2.63	-	-	**100.00**
North	67.22	13.33	12.22	4.44	-	0.56	2.22	-	-	**100.00**
Northeast	68.19	12.89	7.45	4.58	2.87	1.72	1.72	0.29	0.29	**100.00**
South	56.16	8.22	12.33	6.85	5.48	6.16	4.79	-	-	**100.00**
Bangkok and vicinity	71.11	13.33	5.93	2.96	0.74	3.70	0.74	1.48	-	**100.00**
Gender										
Female	65.08	13.36	7.63	5.34	3.24	3.05	1.72	0.57	-	**100.00**
Male	67.65	9.45	9.45	3.99	3.57	2.73	2.94	-	0.21	**100.00**
Education Level										
Elementary	78.95	3.95	9.21	3.95	2.63	1.32	-	-	-	**100.00**
Junior high school	70.73	7.32	4.88	1.22	7.32	8.54	-	-	-	**100.00**
High school/ equivalent	67.86	10.71	11.31	2.98	2.98	2.38	1.19	-	0.60	**100.00**
Diploma	55.08	11.86	10.17	5.93	8.47	4.24	3.39	0.85	-	**100.00**
Bachelor Degree	64.79	14.47	7.34	5.40	2.16	2.38	3.02	0.43	-	**100.00**
Higher than Bachelor Degree	70.97	7.53	9.68	6.45	1.08	1.08	3.23	-	-	**100.00**
Income Level										
Less than 5,000 baht	66.67	11.26	9.66	5.06	3.22	2.53	1.38	0.23	-	**100.00**
5,000 - 10,000 baht	63.25	12.72	8.13	3.53	5.65	3.89	2.12	0.35	0.35	**100.00**
10,001 - 20,000 baht	64.81	11.73	5.56	7.41	2.47	1.85	5.56	0.62	-	**100.00**
20,001 - 30,000 baht	77.97	8.47	8.47	-	-	5.08	-	-	-	**100.00**
30,001 - 40,000 baht	72.73	9.09	6.06	3.03	-	3.03	6.06	-	-	**100.00**
40,001 - 50,000 baht	56.25	12.50	18.75	12.50	-	-	-	-	-	**100.00**
More than 50,000 baht	83.33	8.33	8.33	-	-	-	-	-	-	**100.00**

Table 1 Public opinion : The most critical problem that action should be taken immediately in Thai society (continue)

Unit : Percent

Social Characteristics	Amphe-tamine	Environ-ment (pollution ,waste etc.)	Crime	Natural resource depletion	Prostitu-tion	Traffic conges-tion	Others ex. corrup-tion	Social and economic problem ex. poverty	Not reply	Total
Age										
15 - 18 Years old	68.07	10.08	10.08	1.68	4.20	4.20	0.84	0.84	-	**100.00**
19 - 25 Years old	62.73	14.17	9.71	5.51	2.62	2.10	2.89	0.26	-	**100.00**
26 - 40 Years old	66.87	10.94	6.08	6.69	2.74	3.34	3.34	-	-	**100.00**
41 - 60 Years old	71.71	7.89	9.87	0.66	5.92	2.63	-	0.66	0.66	**100.00**
61 Up years old	73.68	5.26	5.26	5.26	5.26	5.26	-	-	-	**100.00**
Occupation										
Government official	67.63	12.95	6.47	4.32	2.88	2.16	2.88	0.72	-	**100.00**
State enterprise/ company employer	64.44	10.00	8.89	7.78	3.33	2.22	3.33	-	-	**100.00**
Employer	63.11	12.30	9.02	7.38	2.46	3.28	2.46	-	-	**100.00**
Self-employed	68.61	8.76	5.11	2.19	4.38	5.84	5.11	-	-	**100.00**
Student	61.86	14.12	11.30	4.80	3.39	2.54	1.41	0.56	-	**100.00**
General employment	71.79	8.55	7.69	3.42	4.27	2.56	0.85	-	0.85	**100.00**
Agriculturist	100.00	-	-	-	-	-	-	-	-	**100.00**
Others	90.00	5.00	-	-	5.00	-	-	-	-	**100.00**
Pensioner or Unemployed	83.33	-	8.33	8.33	-	-	-	-	-	**100.00**

Source: Mingsarn et al. 2001

Table 2 Public Opinion: The most critical natural resource problem in Thailand

Unit : Percent

Social Characteristics	Forest depletion	Flood	Water shortage	Mangrove depletion	Alkaline soil	Soil erosion	Not reply	Total
Total	47.90	26.30	16.20	3.90	2.70	2.60	0.40	100.00
Area of sample								
Central	47.89	25.79	12.11	6.32	5.79	2.11	-	100.00
North	55.00	27.22	13.33	0.56	0.56	2.78	0.56	100.00
Northeast	41.55	27.79	22.35	2.58	2.58	2.58	0.57	100.00
South	44.52	28.77	12.33	7.53	2.05	4.11	0.68	100.00
Bangkok and vicinity	58.52	19.26	14.07	4.44	2.22	1.48	-	100.00
Gender								
Female	47.71	31.30	13.74	3.82	1.34	1.72	0.38	100.00
Male	48.11	20.80	18.91	3.99	4.20	3.57	0.42	100.00
Education Level								
Elementary	38.16	32.89	15.79	3.95	2.63	6.58	-	100.00
Junior high school	31.71	29.27	23.17	9.76	3.66	2.44	-	100.00
High school/ equivalent	40.48	29.17	17.86	7.74	1.19	2.98	0.60	100.00
Diploma	48.31	24.58	17.80	4.24	2.54	2.54	-	100.00
Bachelor Degree	51.40	26.78	14.90	1.73	2.59	2.16	0.43	100.00
Higher than Bachelor Degree	65.59	12.90	11.83	2.15	5.38	1.08	1.08	100.00
Income Level								
Less than 5,000 baht	40.23	29.20	18.62	5.75	1.84	4.37	-	100.00
5,000 - 10,000 baht	47.70	26.15	17.67	2.47	4.24	1.06	0.71	100.00
10,001 - 20,000 baht	58.02	25.31	11.73	1.23	1.23	1.85	0.62	100.00
20,001 - 30,000 baht	67.80	18.64	8.47	3.39	1.69	-	-	100.00
30,001 - 40,000 baht	60.61	21.21	9.09	9.09	-	-	-	100.00
40,001 - 50,000 baht	62.50	18.75	12.50	-	6.25	-	-	100.00
More than 50,000 baht	41.67	-	16.67	-	25.00	8.33	8.33	100.00
Age								
15 - 18 Years old	36.13	29.41	15.13	10.92	4.20	4.20	-	100.00
19 - 25 Years old	44.36	30.45	17.85	2.62	1.84	2.62	0.26	100.00
26 - 40 Years old	54.71	23.71	15.20	1.52	2.13	2.13	0.61	100.00
41 - 60 Years old	53.29	20.39	15.13	4.61	4.61	1.97	-	100.00
61 Up years old	31.58	15.79	15.79	21.05	5.26	5.26	5.26	100.00

Table 2 Public Opinion : The most critical natural resource problem in Thailand

Unit : Percent

Social Characteristics	**Forest depletion**	**Flood**	**Water shortage**	**Mangrove depletion**	**Alkaline soil**	**Soil erosion**	**Not reply**	Total
Occupation								
Government official	66.19	21.58	9.35	0.72	0.72	0.72	0.72	100.00
State enterprise/ company employer	45.56	31.11	18.89	2.22	1.11	-	1.11	100.00
Employer	53.28	19.67	16.39	3.28	4.10	2.46	0.82	100.00
Self-employed	50.36	24.09	16.06	3.65	5.11	0.73	-	100.00
Student	44.35	28.25	16.10	5.08	2.82	3.39	-	100.00
General employment	32.48	29.91	22.22	6.84	1.71	5.98	0.85	100.00
Agriculturist	44.44	22.22	33.33	-	-	-	-	100.00
Others	45.00	40.00	10.00	-	5.00	-	-	100.00
Pensioner or Unemployed	33.33	25.00	16.67	8.33	-	16.67	-	100.00
Residence								
Within municipal area	44.63	26.17	17.76	4.44	3.50	2.80	0.70	100.00
Outside municipal area	47.83	26.09	19.13	3.04	0.87	2.61	0.43	100.00

Source: Mingsarn et al. (2001)

Table 3 Public opinion : The most critical environmental problem in Thailand

Unit : Percent

Social Characteristics	Air pollution	Solid wastes	Industrial hazardous wastes	Water pollution	Visual pollution	Other environ mental problems ex. slum	Other problems not related to envi. problem	Not reply	Total
Total	**36.90**	**26.70**	**26.60**	**11.50**	**3.50**	**0.40**	**0.20**	**0.20**	**100.00**
Area of sample									
Central	30.53	29.47	25.26	9.47	4.74	0.53	-	-	**100.00**
North	41.11	27.22	17.22	10.00	2.22	1.11	1.11	-	**100.00**
Northeast	40.40	23.21	23.78	8.60	3.44	0.29	-	0.29	**100.00**
South	24.66	31.51	17.81	20.55	4.79	-	-	0.68	**100.00**
Bangkok and vicinity	44.44	25.93	13.33	14.07	2.22	-	-	-	**100.00**
Gender									
Female	37.60	25.19	22.90	10.31	2.67	0.57	0.38	0.38	**100.00**
Male	36.13	28.36	18.07	12.82	4.41	0.21	-	-	**100.00**
Education Level									
Elementary	27.63	30.26	23.68	13.16	5.26	-	-	-	**100.00**
Junior high school	25.61	28.05	26.83	13.41	4.88	-	-	1.22	**100.00**
High school/ equivalent	36.90	24.40	22.62	10.12	5.36	0.60	-	-	**100.00**
Diploma	28.81	34.75	21.19	10.17	4.24	-	0.85	-	**100.00**
Bachelor Degree	42.98	25.05	17.28	11.66	1.94	0.65	0.22	0.22	**100.00**
Higher than Bachelor Degree	34.41	24.73	24.73	11.83	4.30	-	-	-	**100.00**
Income Level									
Less than 5,000 baht	36.09	22.76	22.30	13.33	4.83	0.46	-	0.23	**100.00**
5,000 - 10,000 baht	36.40	29.68	21.55	10.60	1.41	-	0.35	-	**100.00**
10,001 - 20,000 baht	35.80	33.33	16.67	6.79	4.94	1.23	0.62	0.62	**100.00**
20,001 - 30,000 baht	47.46	27.12	11.86	10.17	3.39	-	-	-	**100.00**
30,001 - 40,000 baht	36.36	18.18	27.27	18.18	-	-	-	-	**100.00**
40,001 - 50,000 baht	37.50	31.25	12.50	18.75	-	-	-	-	**100.00**
More than 50,000 baht	41.67	25.00	25.00	8.33	-	-	-	-	**100.00**
Age									
15 - 18 Years old	28.57	24.37	30.25	10.92	5.88	-	-	-	**100.00**
19 - 25 Years old	40.68	26.51	16.80	12.07	3.41	0.26	0.26	-	**100.00**
26 - 40 Years old	37.99	25.53	20.36	12.46	2.43	0.61	0.30	0.30	**100.00**
41 - 60 Years old	32.89	32.89	22.37	6.58	3.95	0.66	-	0.66	**100.00**
61 Up years old	26.32	15.79	26.32	26.32	5.26	-	-	-	**100.00**

Table 3 Public opinion: The most critical environmental problem in Thailand (continued)

Unit : Percent

Social Characteristics	Air pollution	Solid wastes	Industrial hazardous wastes	Water pollution	Visual pollution	Other environ mental problems ex. slum	Other problem not related to envi. problem	Not reply	Total
Occupation									
Government official	33.81	33.81	17.27	8.63	4.32	1.44	0.72	-	**100.00**
State enterprise/ company employer	42.22	25.56	20.00	10.00	1.11	-	1.11	-	**100.00**
Employer	36.89	30.33	15.57	13.11	3.28	-	-	0.82	**100.00**
Self-employed	34.31	26.28	21.17	14.60	3.65	-	-	-	**100.00**
Student	40.96	23.45	20.62	11.30	3.39	0.28	-	-	**100.00**
General employment	30.77	26.50	24.79	11.97	5.98	-	-	-	**100.00**
Agriculturist	22.22	0.00	66.67	11.11	-	-	-	-	**100.00**
Others	30.00	40.00	20.00	10.00	-	-	-	-	**100.00**
Pensioner or Unemployed	25.00	16.67	33.33	8.33	-	8.33	-	8.33	**100.00**
Residence									
Within municipal area	35.98	26.17	23.13	10.98	3.50	0.23	-	-	**100.00**
Outside municipal area	36.09	27.83	18.70	10.87	4.78	0.43	0.87	0.43	**100.00**

Source: Mingsarn et al. (2001)

Annex III

Table 1 Calculation Method of Each Sector in ISEW

No	Sector	Calculation Method
1	Costs of air pollution	= (Number of respiratory syndrome patients) x (Costs of medical treatment) [Cost of medical treatment of each in-patient = 10,202. 69 baht and of each out-patient = 292.35 baht]
2	Costs of water pollution	Calculated from both (1) community and (2) industry (1) For community's costs of water pollution, we considered from 80 percent of tap water utilization (metropolitan and regions) by calculating treatment cost from stabilization of a pond system = Fixed cost + Operating & Management cost = [(Amount of water used by community) x 0.8 x (Fixed cost/unit: 0.6492)] + [(((Amount of water used by community) x 0.8)/365) + 434,300] (2) For industry's costs of water pollution, we utilized 2529 BOD data, allowing BOD to change proportionately to GDP value of each industry sector and activated sludge treatment cost which equal 7,788.16 baht per ton BOD $= \sum_{i}^{5} (growth\ of\ GDP_{it} \times BOD\ load_{2529} \times 7788.16)$ i = Those top five industries that emit highly levels of BOD; food industry, beverage industry, textile industry, paper industry, chemical industry

No	Sector	Calculation Method
3	Costs of waste management	= {(Amount of solid wastes) x (Cost of solid waste management)} + {(Amount of hazardous waste) x (Cost of hazardous waste management)} = [Cost of solid waste management (landfills): 277.21 baht/ton]+ [Cost of hazardous waste management; car battery = 23.80 baht each, car tire = 28 baht each, television = 99 baht each, mobile phone battery = 6.19 baht each]
4	Costs of soil degradation	= [(1) Cost of saline soil in the Northeast] + [(2) Cost of soil erosion] (1) is calculated from [(Saline soil areas in the Northeast) x (Cost of saline-soil effect that decreases agriculturists' income: 206.43 baht/rai/year)] (2) is calculated from [(Urea fertilizer depletion) x (Cost of urea fertilizer)] + [(Super phosphate fertilizer depletion) x (Cost of super phosphate fertilizer)] + [(Potassium Chloride fertilizer depletion) x (Cost of potassium chloride fertilizer)]
5	Loss of forest resources	= (Accumulated decreasing forest area) x (Economic value of the forest: 1,703.45 baht/rai)
6	Loss of wetlands	= (Accumulated decreasing mangrove area) x (Economic value of the mangrove: 10,134.66 baht/rai)
7	Costs of overfishing	= (Excess production each year) x (Fishery value) = [Excess production = (Annual aquatic animal production) – (The highest production capacity in Andaman Sea and Thai Gulf: 1.4 million ton)]

Source: TDRI (2005)

Annex IV

Table 1 List of Interviewees and Workshop Participants

No.	Name	Position	Organization
1.	Burghard Rauschelbach	Director Programme-Component Eco-Efficiency	German Technical Cooperation, 193/63 Lake Rajada Building (16th Flr.) New Ratchadapisek Road, Bangkok 10110
2.	Christer Holtsberg	Counsellor, Director of Swedish Environmental Secretariat for Asia (SENSA)	17th Floor, Unit 1706, One Pacific Place, 140 Sukhumvit Road (Between Soi 4 & 6) Bangkok 10110 Thailand
3.	Johanna Klein	Programme-Component Eco-Efficiency	MoNRE 3rd fl., Pollution Control Department Bldg. 92 Soi Phahonyothin 7, Phahonyothin Rd. Phayathai, Bangkok 10400 Thailand
4.	John Dore	Coordinator for Asia Water &Nature Initiative (WANI)	Regional Wetlands&Water Resources Program (RWWP) The World Conservation Union : IUCN Asia Regional Office 63 Sukhumvit Soi 39 Sukhumvit Rd., Wattana Bangkok 10110
5.	Kirsten Ewers Andersen	Southeast Asia Specialist in Environmental Governance & Social and Institutional Analysis	Galgebakken Sten 4-1a 2620 Albertslund, Denmark
6.	Kit Clausen	First Counsellor (Environment and Development)	Royal Danish Embassy 10 Sathon Soi 1, South Sathon Road, Bangkok 10120 Thailand.
7.	Pattama Vongratanavichit	Program Officer (Development)	15th Fl., Abdulrahim Place, 990 Rama IV Road, Bangkok 10500

No.	Name	Position	Organization
8.	Phansiri Winichagoon	Manager, Environment Unit	UNDP Thailand, 12th Floor, United Nations Building, Rajdamnern Nok Avenue, Bangkok 10200
9.	Pituck Jongnarangsin	Environmental Programme Coordinator	Royal Danish Embassy 10 Sathon Soi 1, South Sathon Road, Bangkok 10120 Thailand.
10.	Saito Mikiya	Assistant Resident Representative	Japan International Cooperation Agency Thailand Office 1674/1 New Petchburi Road, Huaykwang, Bangkok 10320
11.	Thongkorn Hiranraks	Program Officer (Development)	15th Fl., Abdulrahim Place, 990 Rama IV Road, Bangkok 10500
12.	Winston H.Bowman	Regional Environmental Director	U.S. Agency for International Development Regional Development Mission, Diethelm Towers A, 10th Floor 93/1 Wireless Road, Bangkok 10330

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