National Report

Review of Protected Areas and Development

Thailand

National Report on Protected Areas and Development

Lower Mekong River Region

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The PAD Partnership

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Foreword

Thailand's remarkable development progress over the past several decades has often occurred at the expense of its natural resource systems. Forests, seashores and wetlands have been damaged and various types of development infrastructure have replaced natural environments. Economic priorities took precedence over conservation.

Protected areas are the last remaining bastions of Thailand's vital natural resource systems. Awareness of the importance of protected areas in preserving the nation's ecological integrity — on which its sustainable development depends — has grown with rapid modernisation. Increasingly, both the Royal Thai Government and the Thai people have recognised that the kingdom's protected area estate is a vital asset, both for conserving natural systems and species, and for sustaining national economic development potential and the livelihoods of millions of rural people. Thailand's protected areas already form one of the largest systems in the world as a proportion of national territory, and the government plans to increase the protected area estate to 25 per cent over the next decade. The Thai Protected Areas and Development Review is therefore a significant and timely initiative.

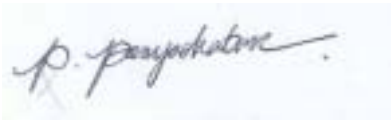
In the past, conservation issues were viewed as being separate from economic development concerns. This is changing, however. Protected area conservation has now become a major consideration for economic planners and a range of government and private sector development organisations. Protected area conservation and national economic development concerns *are* substantially interlinked. The Thailand PAD Review has helped to crystallize the understanding of the multiple benefits that protected areas provide to a range of development sectors. It is now much better appreciated that protected areas are essential for maintaining the capacity of critical ecosystems to support sustainable development. The PAD Review galvanised a multi-sectoral conservation and development constituency, bringing together — in some cases for the first time — specialists from forestry, agriculture, water resources, fisheries, tourism, power generation, transportation and industry. The review enabled specialists representing these diverse disciplines and organisations to reflect on how protected areas contribute to the productivity of various development sectors and how those benefits can best be enhanced and maintained.

This growing consensus about the links between conservation and development and the need to focus greater attention on Thailand's protected area system led to the establishment of the Ministry of Natural Resources and Environment. The Ministry is now in the position to adopt a wider and more inclusive view of conservation issues, and to act on them in a broader developmental context.

Adopting the recommendations emerging from the PAD Review will enable the development benefits of protected areas to be conserved and incorporated into the mainstream of Thailand's development planning process. An initial step is properly valuing protected areas in economic terms and reflecting those values in national and sector budgets and in the overall flow of investment going to conservation. Protected areas need to be planned and managed as important components of the wider development landscape. The government has been piloting the management of complexes of protected areas that are linked through natural

systems and surrounding developments. It has also been exploring various joint management approaches to protected areas so that communities can use and conserve natural resources in the long term. This work needs to continue as part of implementing the PAD Review Report.

It is in the interest of all of the concerned development sectors to put the PAD strategies into action. As this process continues, it will be necessary to capitalise on the experience and continuing support of the PAD partnership. For its part, the government is committed to the ongoing implementation of Thailand's PAD program and will be seeking to put the review strategies into practice.



Prapat Panyachatraksa.
Minister of Natural Resources and Environment

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More than 180 people contributed to the Thai PAD Review, either through interviews, round table meetings, group discussions or written comments and materials. Many are government officers, representing some 25 agencies at national and local levels. This was truly a cross-sectoral review initiated by government, which was intent on building working links between development and conservation managers. Other review contributors came from some ten Thai NGOs, and from international development organisations and conservation projects. This report is rich with their ideas, views and experiences. Their involvement and commitment to conservation in Thailand is deeply appreciated.

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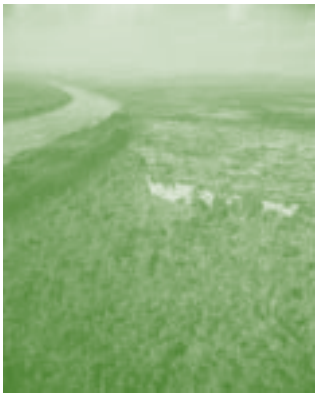

Summary

The four countries of the Lower Mekong River Region (Cambodia, Lao PDR, Thailand and Vietnam) have conducted a review of protected areas and development (PAD). Each country drew together protected area (PA) managers and economic planners from government and NGOs to explore the links between sustainable development and PA conservation. The review identifies key lessons learned over the past several decades in the relationship between development and conservation, natural resource use and protection, and the planning mechanisms for its management. On the basis of that experience, policy options to enhance the contribution of PAs to development were identified.

The Thailand PAD Review included an assessment of the country's environmental situation and of the key development sectors that depend significantly on various environmental goods and services provided by PAs. The review demonstrates the importance of PAs as productive assets in the economy, and thus, the need to manage them effectively to maintain and enhance their contribution to sustainable development.

During the past several decades, Thailand underwent rapid economic development. Despite the country's drift into recession in the 1990s, since 1980 aggregate gross domestic product (GDP) has totalled 142 per cent. Between 1960 and 1990, the area devoted to agriculture doubled, but the area under forest cover was reduced by more than half. The extent and impacts of environmental degradation have become issues of serious national concern. A range of measures and programs has been established to arrest and reverse the negative trends. Since 1987, national socio-economic development plans have included environmental concerns in development policy and planning.

PAs are at the heart of a nation's natural resource conservation strategy. Conserving natural resources is vital in maintaining the productive potential of the national economy. For example, maintaining forest cover is key to conserving national water and soil resources — fundamental assets for agricultural and industrial production. Conserving pristine habitats has direct economic implications for national revenue generation from tourism. Similar relationships exist between PAs and other sectors of the national economy.

Demographic characteristics

Thailand's population increased from 23 million in 1961 to 62 million by 2001. During this period, a successful National Family Planning Program reduced the country's annual population growth rate from 1.9 per cent in 1960 to 0.9 per cent in 2002.

With the increasing availability of urban employment, Thailand's rural farming population declined from around 90 per cent of total population in 1950 to 70 per cent today. A policy to bring swampland under cultivation was accelerated in the 1960s and 70s. With support from the World Bank, the Royal Thai Government encouraged the expansion of export cash crops. Farmer-homesteaders occupied forest areas cleared by commercial logging. By 1980, rapid population growth — combined with a policy to expand commercial agriculture—— led to an estimated 10 million people establishing farms on land which had been declared National Forest Reserve. To resolve this problem, the government established a National Land Reform Program, which providing non-transferable usufruct certificates to poor and landless families.

Policy-induced settlement of previously unoccupied land led to rapid deforestation. In response, the government developed policies directed at protecting forest lands and watersheds. By the 1980s and 90s, as industrial development transformed Thailand into one of Asia's boom economies, the population shift from rural to urban areas relieved some of the pressure on the country's remaining forests.

Governance

Although Thailand experienced unprecedented economic growth in the 1980s and 90s, the benefits were far from equitably shared. In 1992, on the pretext of government corruption, a military coup d'etat established a new regime and replaced the national constitution. Broad-based discontent led quickly to the overthrow of the military government and to calls for a new constitution. The enactment of the People's Constitution in 1997 was followed by the Government Decentralisation and Reform Acts 1998 and 1999.

Increasing public concern about the environment, pressure to downsize government, and recognition that local people should play an active role in natural resource management have combined to impel a movement toward decentralised natural resource and protected area management in Thailand. The new constitution provides a mandate for radical reform of the governance system, and for the management and governance of rural natural resources with people's participation. Recent government reforms attempt to rectify the past reliance on strictly sectoral and expert-designed resource management approaches and to resolve problems associated with overlapping and competing jurisdictions among some government agencies. A restructuring of agencies responsible for conservation and protected area management took place in October 2002 with the establishment of the Ministry of Natural Resources and Environment (MONRE).

Natural resource management

Industrial production has grown steadily over the past two decades and become Thailand's main source of GDP. The country has become one of the world's most important exporters of agricultural products, and is consistently among the top two or three rice exporters. Investment in irrigation infrastructure has enabled production of two to three crops per year on the nation's best agricultural lands. This benefits millions of farming families across the country.

Yet, for several decades Thailand's annual rate of deforestation was among the highest in the world. Timber sales contributed to national revenues. Conversion of deforested areas to export cash cropping helped boost GDP but resulted in widespread watershed degradation. Large-scale hydro-power projects were constructed in several of Thailand's primary watersheds. Although energy production contributed to industrial development it increased access for illegal logging, settlement and wildlife poaching.

Thailand possesses abundant water resources but demand has begun to outstrip supply. Water demand and deficits are expected to increase. Water resource and irrigation development has been a significant contributor to Thailand's domestic and export agriculture, and has led to the depletion of watersheds and aquifers. Industry is dependent on water, but has contributed substantially to the reduction in quality and quantity. Wetlands located in industrial areas have been polluted with toxic wastes (which infiltrate to subsurface aquifers) and have been extensively converted to paddy production.

Thailand's magnificent coastal and marine areas, tropical and subtropical mountain ranges, and unique and diverse cultures have long been highly regarded for tourism. Tourism has become a major employer and revenue provider; more than ten per cent of the work force is currently employed directly or indirectly in the tourism sector. In 2000, tourism contributed 11.4 per cent of Thailand's GDP and accounted for 7.1 per cent of total national capital investment. Tourism has also been a contributor to the clearance of

coastal mangrove forests, pollution of near shore marine environments, and destruction of coral reefs. These environments are vital to sustained tourism revenues and to the nation's important commercial fisheries.

Thailand has become one of the world's most important shrimp exporters, which has involved extensive conversion of mangroves to shrimp farming. Fish catch from the rich fishing grounds in the Andaman Sea and Gulf of Thailand has increased consistently during the past couple of decades, and fisheries exports contribute over US$ 4 billion annually to Thailand's GDP. But the increase in fleet size and in the sophistication of fishing equipment has begun to deplete fish stocks. Higher investment is now required per unit of commercial catch, reducing the profitability of fishing enterprises. The degradation of mangrove forests, sea grass and coral beds - critical for fish spawning, feeding and recruitment - has resulted in declining fish stocks, especially near-shore fish catch. This has had a marked negative impact on the livelihoods of poor artisanal fishing communities.

Thailand's protected area system

Thailand's protected area system was inaugurated in the 1960s following enactment of the *Wild Animals Reservation Act* (1960) and the *National Parks Act* (1961). Area gazettal increased rapidly during the 1980s and 90s. Although one of the primary objectives of PA gazettal was to conserve biological diversity and critical habitats, most contiguous forest areas were already diminished. Wetland, brackish and freshwater sites were under-represented and several biogeographical zones were not sufficiently covered. As of July 2002, there were 81 terrestrial national parks and 21 marine parks with a total coverage of more than 18 per cent of the kingdom's total land area.

Thailand's PA system is fragmented. Many of the areas may be too small to sustain their flora and fauna, especially populations of large mammals, including tigers, leopards, elephants and bears. Recent efforts to redress deficiencies in coverage of habitat include the declaration of 19 protected area complexes. Each complex comprises a number of protected areas in a shared geographic region; 17 complexes encompass forest habitats, while 2 cover marine and coastal habitats.

Protected area management

The national PA system lies at the heart of efforts to maintain environmental goods and services for sustained productivity in various economic sectors. The number and area of various categories within the system is changing rapidly, with ongoing additions aimed at increasing the area to 25 per cent of Thailand. The Department of National Parks, Wildlife and Plant Conservation (DNWP) under MONRE is working to revise its current system of protected area classification to bring it in line with internationally accepted IUCN categories.

Five-year management plans are being produced for all gazetted national parks and wildlife sanctuaries. By 1999, more than 30 national parks and about 20 wildlife sanctuaries had approved management plans. Local communities and other stakeholders are now consulted during the planning process. A committee comprising representatives from DNWP, the Tourism Authority of Thailand, universities and selected NGOs review the management plans. Internal monitoring indicates that PA management plans have around a 50 per cent implementation rate. The reasons for this moderate performance include prescriptions being too elaborate or demanding, insufficient staff, insufficient time or inadequate equipment.

A number of pilot projects have been implemented in response to difficulties over resource use between PA managers and local communities. Frequently, PA boundary demarcation is now carried out by walking the proposed boundary lines with local community representatives. Local communities and civil society groups are increasingly outspoken in their demands for a more substantive role in the design of PA management plans, and in the actual implementation of PA management activities.

Future directions in protected area management

Broad priorities for action to improve PA management include:

- developing a national protected areas system plan and an appropriate legal framework for its management;
- developing policies and approaches that maintain economic benefits while ensuring effective protection of core conservation zones;
- developing and improving formal processes for multi-stakeholder consultation and sharing of protected area and environmental management responsibilities and benefits;
- providing training to PA management staff in facilitating collaborative management;
- clearly demarcating PA boundaries, especially those of core zones;
- creating natural corridors between PAs in forest and marine protected area complexes;
- improving the environmental impact assessment process, laws and the enforcement of laws against activities damaging to PAs and natural systems; and,
- establishing site level protected area advisory committees.

Many development sectors receive benefits from PAs and need to be involved in their conservation and enhancement.

Forestry development and protected areas

Protected forests make important contributions to a number of economic sectors. The maintenance of forests in their natural state is associated with the provision of a range of ecological services.

Future directions:

- Zone protected forests to reflect a range of regimes, from protection to sustainable multiple use.
- Establish community forestry in and around PAs.
- Establish natural corridors linking PAs.

Ratify the International Convention on Biological Diversity (CBD)

Water resource management and protected areas

Forested watersheds and natural wetlands within protected areas are extremely important in the effective management of national water resources.

Future directions:

- Establish site-level watershed management committees.
- Establish fire protection associations within local communities.
- Increase storage capacity without negatively affecting watershed forests.
- Rehabilitate degraded watersheds.
- Increase water use efficiency.

Energy development and protected areas

The energy sector is undergoing a period of restructuring and privatisation. Thailand produces only about 20 per cent of its energy from domestic fossil fuels and hydro-power. With the country's economy beginning to recover from the global economic slowdown, energy demand is expected to increase.

Future directions:

- Develop sub-watershed conservation schemes.
- Emphasise research on and development of alternative energy sources and their maintenance through PAs.
- Tighten controls over energy exploration in PAs.
- Provide for EIAs of energy proposals in national PA legislation.
- Introduce a "user pays" system so that energy facilities contribute to the maintenance of ecosystem services they receive.

Tourism and protected areas

Ecotourism is now the fastest growing sector of the global tourism industry and Thailand stands to gain significant economic benefits by safeguarding the integrity of its natural environment. The number of tourists coming to Thailand has increased steadily, from 1.2 million in 1977 to 7.44 million in 1996. By 1996, the collective expenditures of international tourists to Thailand increased to $11.25 billion, becoming the country's primary source of foreign exchange.

Future directions:

- Apply the user pays principle so that a proportion of tourism revenues go to improve protected area management.
- Plan and implement tourism development to ensure environmental sustainability and maintenance of conservation assets.
- Initiate collaborative planning and management approaches to tourism with PA stakeholders
- Involve the National Protected Area Committee, Site Advisory Committees and communities in monitoring tourism activities.
- Increase public sector investment in sustainable tourism.

Agricultural development and protected areas

PAs support agriculture in various important ways; for example, in providing reliable water resources, in maintaining genetic resources and in providing habitat for pollinators. Yet, encroachment of PAs is a serious threat.

Future directions:

- Involve local communities in participatory demarcation of protected area boundaries.
- Shift to sustainable agriculture practices, including new forms of protected areas, throughout the agricultural landscape to conserve habitat corridors and gene pools as well as water and soil resources.
- Facilitate the expansion of appropriate protection regimes through farmer networks.

Fisheries development and protected areas

The productivity of both inland freshwater fisheries and near shore and marine fisheries depends on the protection of a range of ecosystems, including mangrove and riparian forests, riverine rapid and shoal systems, sea grass beds and coral reefs. Thailand's commercial fisheries industry has contributed

significantly to national GDP, with total revenues of more than US$4 billion in 1998. As of 1998 the fisheries sector employed nearly one million people. Although Thailand's fisheries outputs grew steadily over the past decade, this has led to over-exploitation of fish stocks and destruction of habitat. Fisheries production is expected to level off and then decline.

Future directions:

- Rehabilitate and protect mangrove and coral reef systems.
- Extend protection over riverine systems and wetlands.
- Introduce collaborative management of MPAs that involves resource users.

Roads and protected areas

Roads and transport play a critical role in the attainment of higher living standards. While roads through PAs can facilitate efficient transport, they can also fragment critical habitat, destroy natural assets and place critical natural resource systems in jeopardy by opening them up to illegal exploitation.

Future directions:

- Minimise disruption to PAs and ensure that road construction causes minimum environmental damage.
- Where feasible, establish checkpoints along access routes to control traffic volumes and illegal activities within PAs.

Community development and protected areas

Thailand stands on the threshold of a significant change in the ways in which rural communities are involved in natural resource management in areas adjacent to and within PAs. Discussions are ongoing regarding the precise wording of the pending Community Forestry Law. The law should also establish a set of principles and guidelines for the sustainable management of coastal and marine resource systems by local communities. It is now widely accepted that local stewardship of natural resources plays an important role in the long–term sustainability of their use.

Future directions:

- Extend the use of local agreements for community-based resource management.
- Enhance community relations skills among forestry and natural resource management professionals.

Economic development and protected areas

There is a shift from viewing PAs as isolated pockets of conservation to planning and managing them as productive components of development landscapes. Each PA has its own characteristics, and its own potential to contribute to development. The total economic value of PA goods and services to surrounding communities and sectors is very significant.

Future directions:

- Prepare a national PA system plan and comprehensive PA legislation.
- Increase user fees for a range of environmental services and ensure that revenues enhance PA management.
- Develop forest and marine complexes through cooperative management of groups of PAs and establishing connecting corridors to extend and conserve habitat.
- Zone PAs for a range of activities, from multiple sustainable use to strict conservation.
- Devolve PA management authority to regions, provinces and districts.
- Develop capacity to support devolution of protected area management authority.

1 Thailand Protected Areas and Development Review

1.1 PAD Review in the Lower Mekong Region Countries

In response to growing tensions between conservation and socio-economic objectives and activities, a review of protected areas and development has been carried out for the four countries in the Lower Mekong River Region (Cambodia, Lao PDR, Thailand and Vietnam). The review draws together protected area (PA) managers and economic planners from governments and NGOs to explore the contribution of protected areas to sustainable development. The review analyses the relationships between protected areas and patterns of resource use across the wider landscape. It assesses the planning mechanisms and economic forces that have shaped resource use during the past several decades and defines a framework of strategies and actions intended to enhance both development and conservation benefits provided by the growing national protected area systems.

1.2 The Thailand National PAD Review

Since September 2001, the Thailand PAD Review has involved more than 180 national experts from various Royal Thai Government ministries and departments, and a host of non-government environment organizations. They have debated the interrelationships of conservation and economic development through a series of round table meetings, working groups and field studies. The review team has prepared a series of thematic papers that assess Thailand's environment situation, and its relationship to key development sectors that significantly depend on protected areas to deliver various environmental goods and services.[1] The PAD field study along the eastern seaboard of Thailand's Eastern Forest Complex, for example, was undertaken by an intersectoral group and provided detailed insights into the contributions of protected areas to development in that region.

The Thailand PAD Review aims to enhance understanding among policy-makers of the existing and potential contributions of PAs to different sectors of the national economy, including the well-being of many rural communities whose livelihoods depend upon PA goods and services. It aims to demonstrate the importance of PAs as productive assets in the economy, and to propose policies and tools for effectively safeguarding those assets.

1.3 Environmental impacts of rapid economic development in Thailand

During the past 25 years, Thailand has undergone rapid economic development. Aggregate gross domestic product since 1980 totalled over 142 per cent, in spite of the country's short drift into recession due to the Asian financial crisis and the global economic slowdown in 1997.

A substantial proportion of the nation's economic growth has depended on rapid exploitation of its rich natural resource endowments. As a consequence, Thailand has suffered the undesirable environmental impacts widely experienced in other transitional economies around the world. The kingdom's environment has been degraded by unsustainable resource exploitation, ecosystem conversion to economic uses, and environmental pollution from industrial, agricultural and other development-related sources. Between 1960 and 1990, over half of Thailand's remaining forest cover was cleared, while the area devoted to agricultural

1 Environmental goods are tangible commodities including, for example, fish, non-timber forest products and water resources, while the term "environmental services" refers to the values provided by ecosystem functions. These include sustained fisheries production based on mangroves and coral reef habitat, and hydro-power based on protection of forested watersheds and wetlands.

production doubled. Agricultural expansion resulted in the conversion of a substantial proportion of the country's remaining natural freshwater wetlands, and prevented regeneration of an extensive area of deforested uplands. Many of the country's coastal mangrove forests were converted to shrimp farming and Thailand became one of the world's foremost shrimp exporters. Expanding tourism-related developments at major tourism destinations also had serious environmental impacts, particularly on coastal beaches and island archipelagos.

Although the kingdom's ecological integrity has been affected by rapid economic growth, it is by no means too late for remedial action. The extent and impacts of environmental degradation in Thailand have become issues of serious national concern. Environmental awareness, relatively low when resources were abundant, has grown dramatically among policy-makers and the public alike. It is increasingly understood that when environmental and natural resource management is unsustainable, there are direct negative impacts on the nation's economic production capacity. Since the Sixth National Economic and Social Development Plan (1987-1991) environmental concerns have become central to the consideration of national economic development policy.

1.4 Protected areas and economic development

Protected areas are the backbone of Thailand's natural resource conservation strategy, which in turn is vital in maintaining the productive potential of the national economy. For example, protecting forest areas conserves national water resources that sustain agricultural and industrial production. Forests are key regulators of climate and hydrology, guarding against economic losses resulting from floods and droughts. Protecting forest habitats and their biological and genetic resources also has direct and indirect economic benefits; for example, wild organisms have a range of potential pharmacological uses. Natural environments often contribute to national revenues through the tourism industry. Similar relationships exist between other types of protected areas, including coastal and marine zones, coral reefs and wetlands, and their delivery of development benefits to a range of economic sectors.

Thailand enacted legislation early in the 1960s as a prerequisite to establishing its protected area system comprising its national parks, wildlife sanctuaries and other reserves. The principal objective in establishing protected areas was to ensure conservation of the kingdom's array of plant and animal species, and its intrinsic scenic beauty. In 1987 (reaffirmed in 1992), Thailand's natural forests were closed to logging; in 2001, a similar ban was placed on conversion of coastal mangroves. During the past several decades, and more specifically since the landslide catastrophe in the deforested southern mountains of Nakhon Si Thammarat Province in 1987, the number and area of terrestrial parks and sanctuaries in Thailand have increased dramatically. Thailand has placed more than 18 per cent of its land area under some form of legal protection status, one of the highest rates in the world.

Yet, the critical support role provided by protected areas to economic development remains relatively poorly appreciated. Not infrequently, when conflicts arise between conserving natural systems and proceeding with economic investments that may result in adverse environmental impacts, the decisions favour development. However, since establishing the National Environment Board in 1992, Thailand's laws and procedures enabling consideration of environmental impacts in project planning have taken a significant leap forward.

An emotional issue of national debate is the estimated one third of Thailand's rural villages living close to or within protected areas that depend on forest and marine resources for their livelihoods. Thailand's poor agrarian and fishing populations have not benefited significantly from the nation's rapid industrialisation and economic development. Rural communities continue to depend substantially on local natural resource systems for livelihood, yet natural areas are increasingly being placed off-limits to traditional subsistence uses, either through modern forms of development or as more are confined behind the

boundaries of gazetted protected areas. For the past two decades, a national debate has continued on whether protected area resources can be used for rural subsistence while still ensuring ecological integrity. The recently enacted Constitution (1997) guarantees local communities the right to be involved in the management and sustainable use of natural resources. Just how those rights are expressed in practice is currently under consideration by a joint Senate and Lower House of Parliament Committee, which is deliberating the proposed Community Forestry Act. The subject has also been the primary focus of the government's Pilot Protected Areas Project, which is testing joint management regimes in six national parks throughout the country.

Thailand's commercial fishing industry is now amongst Asia's largest with an average annual contribution to the national economy of more than US$ 4 billion (not including secondary processing industries, which are also substantial). It is now better understood that protection of marine and near-shore sanctuaries and associated coastal mangrove forests and wetlands is critical to sustaining the productivity of the rich Gulf of Thailand and Andaman Sea fishing grounds. Marine national parks are becoming an essential development strategy for fisheries and for maintaining seaside tourism revenues that are Thailand's primary source of foreign exchange. But seaside attractions and coral reefs have been seriously damaged by poorly controlled tourism-related developments. Thailand's tourism industry and its significant revenue stream are in jeopardy as a result of ongoing environmental deterioration.

Protected areas provide a range of environmental goods and services vital to economic development. Maintaining the capacity of protected areas to deliver these development benefits depends on their effective management. This does not imply that protected areas need to be kept off-limits to any uses. Efforts to enforce such strict controls have been unsuccessful and unproductive. Among the principal reasons that rigid protection does not work is the longstanding dependence of large numbers of society's poorest members on protected area resources. Arrangements are needed in which the various objectives of natural resource and habitat protection can be achieved, while accommodating multiple sustainable uses.

Such approaches are being explored in Thailand through a number of pilot initiatives. These include the joint management pilot project referred to earlier, the ecosystem management approaches being tested in the Western Forest Complex and more recently in the East Forest Complex, the River Basin Management initiative, and activities of the Royal Projects Foundation and a host of community-based integrated conservation and development projects supported by national and international environment and development NGOs.

Part 1: Thailand's biophysical and demographic characteristics and their implications for protected areas

2 Biogeographic characteristics

Thailand is centrally located in mainland South East Asia between 5°37' and 20°30' latitude north and 97°20' and 105°39' longitude east. The country's total area is 514,100 square km. Elevation ranges from sea level to 2,590 metres on Doi Inthanon near the northwestern boundary with Myanmar. The country has large tracts of cultivated lands covering over 50 per cent of total land area (Land Development Department 2001).

2.1 Climate

Thailand has a tropical monsoonal climate with a distinct wet season and a long hot dry season. Most parts of the country receive over four-fifths of their annual rainfall during the southwestern monsoon, from May to October. Some areas of the peninsula, particularly on the eastern coast, and in the extreme southwestern provinces, receive some additional rainfall from the northeast monsoon during November to January. The southernmost provinces of Pattani, Yala and Narathiwat provinces receive rain in both monsoons but are wettest in November and December.

The driest, most seasonal areas are in the very centre of the Khorat plateau, in the country's northeastern 'bulge', and in some parts of the west, which lie in the rain shadow of the mountains along the Burmese border. The average annual rainfall of some of these areas is less than 1000 mm. The wettest areas lie in the extreme southeast, and on the west coast of the peninsula, where the average rainfall is 3000 to 4000 mm per year.

The average annual temperature in most of the country is approximately 26-29 °C, but there is considerable range, with the more landlocked parts displaying more variation than the coastal regions. In the hottest month, usually April, daytime temperatures in the lowlands may rise to over 40 °C. In the coolest months of December and January, ground frosts are frequently recorded on exposed ridges on the higher mountains of the North. These marked regional variations in climate have a direct influence on the vegetation found in the different parts of the country.

2.2 Ecological regions

The distribution of the world's fauna has been categorized into six zoogeographic regions. Thailand falls centrally within the Oriental Region. Within this region, Thailand lies at the zoogeographical crossroads of South East Asia. Continental Thailand supports fauna and flora with clear affinities to Burma and India to the west, Indo-China to the east, and mixed affinities to the north. In peninsular Thailand, fauna and flora are predominantly Sundaic, having affinity with Malaysia and the more westerly islands of Indonesia.

The main features of Thailand's six principal zoogeographic or ecological regions are set out briefly below:

The North

The North is a mainly mountainous region divided by a number of north-south hilly ridges. The region is drained via the Ping, Wang, Yom and Nan rivers southward into the Chao Phraya River of Thailand's Central Plains. Small areas in the north of this region drain into the Mekong River, while parts of the west lie in the watershed of the Salween River. Virtually the whole area lies above 200 m elevation, and there are large areas of uplands above 1,000 m. Among the few peaks above 2000 m is Doi Inthanon, Thailand's highest mountain (2565 m). Average annual rainfall in the lowlands varies from 1000-1500 mm over most of the region. Deciduous forests dominate the lower elevations and the climax vegetation of the higher mountains (above 800 m) is broad-leafed montane evergreen forest, sometimes referred to as hill evergreen forest. Native pines are also fairly widespread. The area of both lowland and montane forests has been much reduced and most of what is left is extensively disturbed.

The West

The West is mainly hilly, extending along the Burmese border, from roughly 16°30' N to 11° 40' N. Covering a large north-south span the west is an area of great zoogeographical interest. Much of the area is hot and dry, although rainfall increases farther west and south and may be over 2000 mm in some areas fringing the Burmese border. The west is of great value for mammalian conservation because it supports the largest remaining expanses of forest and woody secondary growth in Thailand. The lowlands and lower hills are mainly dominated by mixed deciduous forests, including some large areas of little disturbed valley bottom along the upper reaches of the Khwae River system.

The Northeast

Northeast Thailand is a dry plateau at 100 to 200 m elevation. It drains to the Mekong River, which forms the region's northern and eastern border. To the west, the plateau is bordered by the flat-topped mountains of the Dong Phaya Yen mountain range and to the south, along the border with Cambodia, by the Phanom Dongrak range. The rainfall is mostly very sparse (less than 1000 mm in some parts at the centre of the region) and highly seasonal. Most of the northeast once supported open deciduous woodlands (mainly dry dipterocarp) and savanna, with evergreen forests being largely confined to the mountain slopes. Some lowland evergreen forest formerly occurred in the extreme northeast, bordering the Mekong River, but it has now been almost completely cleared.

The Southeast

The southeast is a predominantly lowland area, bordered to the south and west by the Gulf of Thailand and to the east by the Cambodian border. A belt of dry lowlands along the Bang Pakong River, which runs east-west, separates this region from the northeast. The rainfall in this region is generally higher than in most other regions of continental Thailand, with some areas receiving 3000-4000 mm of rain per year. Hence, most of the lowlands were once covered with evergreen forest. The mountains of Khao Soi Dao, an outlier of the Cardomom Mountains of South-west Cambodia, rise to 1670 m elevation.

The Central Plains

This region comprises the alluvial basin of the Chao Phraya River, which flows into the Gulf of Thailand at Bangkok. Other major rivers, (the Mae Klong and Tachin to the west and the Pa Sak and Bang Pakong to the east), flow through the Central Plains. Most of the Central Plains lies below 50 m elevation and some parts in the south are less than 10 m above sea level. The only significant uplands are jagged limestone

outcrops and low spurs extending from hill ridges of the surrounding regions. The average annual rainfall may reach 1400 mm on the coast around Bangkok, though rainfall is substantially less (around 1100 mm) in the north of the region, towards Nakhon Sawan. The formerly extensive swamps and lowland forests of the Central Plains were mostly lost by the early twentieth century, as rice became a major export crop.

Peninsular Thailand

Peninsular Thailand is considered to extend southwards from roughly 11° 40' N latitude. The peninsula varies in width from roughly 50 km to 220 km and a mountainous backbone runs its full length. The highest mountain is Khao Luang (1835 m) in Nakhon Si Thammarat province. The rainfall is less seasonal than in continental Thailand; annual rainfall is over 2000 mm for most of the area and exceeds 3000 mm in some parts. Rainforest is the natural climax vegetation of the Peninsula and formerly covered almost the entire area. However, the lowlands have all but been cleared for agriculture and almost all the remaining forest is found on steep slopes.

Mangrove forests are an important habitat in the Peninsula, the most extensive of which occur on the west coast. Sea grass beds and mudflats are found in association with these forests.

2.3 Habitats

2.3.1 Terrestrial forests

The distribution of forest types is complex, being primarily influenced by climate, topography and soil types. Local factors, such as drainage, exposure and proximity to watercourses also influence the distribution of tree species.

There are two general types of forest: *evergreen* and *deciduous*. Evergreen forests, in which the leaves remain green year round, are found in climates with a dry season of less than three months, in areas with mean annual rainfall greater than 1,500 mm, and may be found up to the highest peaks in the country. By comparison, deciduous forests, in which the trees shed their leaves as a response to water stress during the dry season, are found in climates with more than three months of drought and less than 1,500 mm mean annual rainfall. They are generally found in the lowlands, but may also be present at up to 1,200 m.

The following habitat classification incorporates forest categories suggested by the Royal Forest Department in *Plants for our Future: Botanical Research and Conservation Needs in Thailand* (Royal Forest Department 1991).

Evergreen forests

Malayan Mixed Dipterocarp Forest: This tall lowland forest occurs in climates lacking a regular dry season, being confined to the extreme southern provinces.

Monsoonal Evergreen Forest: is a tall lowland forest unique to Indo-Burma, occurring up to about 800 m in areas where annual rainfall exceeds 2,000 mm and the dry season is less than three months long. There are two geographical types, differing in species composition and soils, and largely in geographical distribution. Peninsular Monsoonal Evergreen Forest is found from Chumphon Province southwards, usually on clay rich soils derived from granite.

Southeastern Monsoonal Evergreen Forest is found in extreme southeastern Thailand.

Dry Evergreen Forest occurs in seasonal climates with between three and five dry months and more than 1,500 mm mean annual rainfall, and as gallery forest into the driest Thai climates, often with *Dipterocarpus alatus* dominant. Fire may occasionally penetrate this forest, temporarily replacing the understorey with bamboo.

Montane Forests occur from 800ß m - the diurnal cloud base - upwards. Two altitudinal types may be recognised. Lower Montane Forest is found from 800 to 1,800 m. It tends to be taller than Upper Montane Forest. Upper Montane Forest is found above 1,800 m, being confined to the highest peaks.

Limestone Forests are found at many localities throughout the country, forming karst topography. These karsts are devoid of soil and subject to extreme water stress. Due to their precipitous topography, they generally remain well forested.

Peat Swamp Forests are found in wet equatorial climates, where the absence of a dry season permits oligotrophic peat accumulation. Confined to the southern peninsula, they were once far more extensive, but have been almost entirely lost. Of note is an 80-sq-km remnant, at Chalerm Pa Kiet Wildlife Sanctuary (Pa Phru) in Narathiwat province.

Mangrove is a low stature, tropical evergreen forest with a unique flora that show a number of specialized adaptations enabling them to survive inundation by brackish and saline waters. A zone subject to the highest seasonal tides backs mangroves but otherwise they remain dry. Mangroves are found in sheltered inlets and estuaries, often in association with extensive sea-grass beds and intertidal mudflats.

Deciduous Forests

These forests are found in the lowlands, only occasionally up to 1,200 m, in climates with more than three months of drought and less than 1,500 mm mean annual rainfall. People, by means of fire, have extended these forests at the cost of the evergreen types, so that their original extent is impossible to ascertain. They comprise Mixed Deciduous Forest, which is found on clay rich, relatively fertile soils throughout Continental Thailand and Dry Dipterocarp Forest which is present on acid infertile sandy and laterite soils in Continental Thailand.

2.3.2 Freshwater wetlands

Since early historical times, rice and other wetland products, including fish, amphibians and wild plants collected from in and around paddy fields, provided the main subsistence diet and livelihood for the population. Wetlands were long considered to be a free public benefit. Widespread conversion to paddy fields has eliminated all but a few natural wetlands areas. Recently, the importance of wetlands to the management of national water resources has been reinforced following a national survey, as has their importance as habitat for a wide range of unique plant and animal species, and nesting and homing grounds for many migratory birds.

Freshwater wetlands, including peat swamp forest, are of major importance. The large rivers represent an important wetland habitat, but they have been greatly altered through intensive human use, including settlements and deforestation of their accessible environs. Consequently, riverine habitat and associated floodplains have rarely, if ever, been incorporated into the protected area network. The large expanses of reeds and *Saccharum* grasslands along riverine floodplains constitute other important wetland habitats, but they have been almost entirely lost, and expansive marshlands have been widely drained, canalised and converted to paddy fields.

In the past 30-40 years, a number of large reservoirs have been created in steep-sided valleys for hydro-electric generation. These reservoirs support little wildlife due to their steep-sided and deep configuration with few fringing marshes.

The geographical distribution of remaining natural wetlands is as follows:

Northern Region

In the northern region, consisting of 17 provinces, 0.6 per cent of the total land area of 169,000 square km is covered by water. Eight sites have been identified as having international conservation importance. A total of 57 sites are considered nationally important.

Central and Eastern Region

This region has a rich system of wetland areas in its 26 provinces covering 129,723 square km. Eleven are recognised as having international conservation importance, including the Bung Boraphet, the Kwae Yai River System, Kwae Noi River, Mae Klong River and wetlands in and around Khao Sam Roi Yod National Park. In total, the central and eastern regions comprise 47 nationally important wetlands, which are located in and around 18 national parks and wildlife sanctuaries. There are eight additional protected wetlands associated with Non-Hunting Areas.

Southern Region

The Southern Region can be divided into the east and west coasts. There are many rivers on the east coast with important associated wetlands. In the southern portion of the region, there are at least 5,478 wetlands areas comprising 28,465,882 square km or 5.55 per cent of the total land area of Thailand. Many of these areas are located in Nakhon Sri Thammarat Province in the far south. Twenty-nine southern wetlands are considered to be of international conservation importance. Forty-one are considered nationally significant and 4,088 wetlands are important locally.

The North-east

The region consists of 19 provinces with its river systems including the Moon, Chi and Songkram flowing to the Mekong River. It is the second largest region after the Northern. The Khorat Plateau contains 12 wetlands of international conservation significance and 10 wetlands of national importance.

2.4 Biodiversity wealth

Thailand's latitudinal profile extends 16 degrees and 1,860 km from just north of the equator to near the temperate climate zone. With its climatic diversity, topographic complexity, long coastline (2,710 km), and extensive fringing reef system, the kingdom is endowed with a wide variety of floral and faunal habitats as well as a rich biodiversity. The biodiversity Index prepared by MacKinnon (1997), for example, is 9.8, the highest of the five Indo-Chinese countries. Nine per cent of all species known to science can be found in the country (Bugna and Rambaldi 2001).

MacKinnon estimated that between 20,000 and 25,000 species of vascular plants occur in Thailand, including 10,000 to 15,000 flowering species. There are more than 500 trees species and 1,000 orchids. Vertebrates number at least 3,000, including 265 mammals, 934 birds, 325 reptiles, 110 amphibians and 1,450 fishes. While biodiversity in Thailand is rich, it is also significantly threatened (WCMC 1998).

2.4.1 Threats to biodiversity values

Habitat degradation and depletion has been widespread, often as a direct result of rapid economic development (for example, road and dam construction, urbanisation, agricultural expansion), forest conversion to agriculture, forest fire, destructive fishing methods, and so on. The protected area system is fragmented and there are concerns that the size of many gazetted national parks and wildlife sanctuaries are insufficient to sustain their flora and fauna, especially the populations of large mammals e.g. tigers, leopards, elephants, and bears (Vivajsirin et al. 2001).

2.5 Thailand's protected area system

Thailand's protected area system was inaugurated in the 1960s following the enactment of the *Wild Animals Reservation and Protection Act* (1960) and the *National Parks Act* (1961). Area gazettal began increasing rapidly in the 1980s, by which time the nation's forests had already begun to be substantially degraded and fragmented, primarily due to logging, agricultural expansion and settlement. Among the primary objectives for gazetting protected sites was the conservation of biological diversity and critical habitats. Contiguous forest areas were already downsized to the extent that gazetted sites tended to be mostly small and mid-sized. Wetland areas and brackish and freshwater coastal sites tended to be under-represented. There was less deliberate effort to ensure that specific biogeographical zones and habitats were sufficiently represented in the system.

From 1989 on, the protected area system expanded rapidly as a result of the logging ban and other government conservation policies. To October 2002, the system was managed and supervised by the Royal Forest Department. Now protected areas are managed by the Department of National Park, Wildlife and Plant Conservation (DNWP) with RFD focussing on forest plantation and production. Both departments fall under Ministry of Natural Resources and Environment (MONRE).

As of July 2002 there were 81 terrestrial national parks, encompassing 46,453 square km or 9.07 per cent of the country. These include 33 reserves in the north covering 20,960 square km (4.09 per cent of national territory); 20 parks in the north-east covering 10,320 square km (2.01 per cent); 12 reserves in the western, central and south-eastern regions encompassing 8,535 square km (1.66 per cent); and 16 reserves in the peninsula covering 6,637 square km (1.29 per cent) (National Parks Division 2002).

There are also 21 marine national parks, taking in six archipelagos, a bay dominated by mangroves, ten coastal parks encompassing stretches of beach, another mangrove site, a coastal site protecting a diverse range of wetland ecosystems, and a forested site dominated by Malayan mixed dipterocarp forest. These areas cover another 5,810 sq km (or 1.13 per cent). Following the creation of DNWP in October 2002, management of terrestrial and marine national parks were merged. Now, they both are under one administration - the Office of National Parks.

Fifty five wildlife sanctuaries covering 35,476 square km (or 6.97 per cent), and 55 non-hunting areas that protect 4,409 square km of habitats are under the administration of Office of Wildlife Conservation within DNWP.

A further 38 reserves are scheduled to be gazetted as terrestrial national parks in the near future, adding18,992 square km (3.71 per cent) to the national system. Of these, 26 reserves (protecting 15,274 square km) are located in the north. Another six marine national parks are proposed. Map 1 shows the location of designated protected areas.

Map 1: Thailand's national protected areas system (2002)

2.6 Forest Complexes – an ecosystem approach to protected area management

Nationwide, protected areas have been grouped into 19 "forest complexes" to facilitate their planning and management on an ecosystem basis (Map 2). Of the 19 complexes, 17 are forest habitats, while 2 are marine habitats. The complexes include human settlements and infrastructure developments.

While the forest complex approach to PAs remains in an informal testing phase, it has been recognised and promoted at ministerial level. Over the past three years, the government with support from Denmark has tested ecosystem management in the Western Forest Complex. In 2003, MONRE decided to extend the approach to other important forest complexes.[2] A second demonstration project has begun covering the Khaoyai-Dong Paya Yen Forest Complex, with an extension of the demonstration activity envisaged for other high-priority complexes.

This is an important initiative of government, one that paves the way for more effective integration of protected areas with development throughout wider landscapes. Also, it creates opportunities for connecting PAs in networks to enhance their conservation potential. The complexes are exposed to very different population pressures and intensities of resource use. The Western Complex, by far the largest in the country, comprises 17 contiguous protected areas while others include fewer PAs isolated in an expanse of agricultural land.

2 Memo 0100/185 from Mr Prapat Panyachatirak, Minister of MONRE, dated 3 February 2003 concerning "Guidelines for ecosystem management in protected areas".

Map 2: Forest complexes and protected areas

3 Demographic characteristics

Thailand's population increased from 23 million people in 1961 to nearly 62 million by 2001 (ODCI 2001). During this period, a successful National Family Planning Program reduced the country's annual population growth rate from 1.9 per cent in 1960 to 0.9 per cent, the lowest rate of population growth among countries in the Mekong sub-region (Thailand Official Census 2000). The country's current population density is 121.2 people per square km. The highest concentration is in urban areas, where 30 per cent of the population currently resides (PRB 2001).

3.1 Trends and changes in employment and land use

With the increasing availability of urban employment in recent decades, Thailand's rural farming population has declined from around 90 per cent in 1950 to 70 per cent today. Most of this change has occurred during the past 15 years. For most of the past century, however, Thailand pursued a general policy of bringing more forest and swamp land under cultivation. Implementation of this policy accelerated in the 1960s and 70s as the government (RTG), with World Bank support, encouraged the expansion of export cash cropping. Farmer-homesteaders subsequently occupied forest areas cleared by commercial logging. Later, the government provided them with credit and subsidies. As Thailand's population increased, landless and land-poor families continued to migrate to forest frontier areas, clearing land for crop production. By 1980, rapid population growth, combined with the policy to expand commercial export agriculture, had led to an estimated 10 million people establishing farms on land that, in 1964, had been declared National Reserved Forest. According to the Thailand Development Research Institute, more than 20 per cent of the country's villages are located in National Reserved Forest (Grey 1991). Today, Thailand's protected area system is remarkable in its spread across regions of high to low population density (Map 3).

To resolve the problem of settlement on forest land, in 1975, RFD commenced the Forest Village Program, which supported forest dwellers through livelihood activities, such as education, agricultural cooperatives, and the allocation of forest land for agriculture and settlements. In 1979, Cabinet approved a program to issue forest settlers with a non-saleable usufruct certificates called *Sithi Tham Kin* or Sor Tor Kor meaning "right to farm". The STK Program aimed to issue each family 15 rai or 2.4 acres for their crops and to allocate more than 48,000 square km. But it was not popular, lacking a credit facility or financial institution unlike other types of saleable land titles such as Cha-node and Nor Sor Sam (meaning individual ownership with full rights) or creditable title such as those provided under the Sor Por Kor Program.

In 1982, the Agriculture Land Reform Program (Sor Por Kor) replaced Sor Tor Kor. RFD transferred 70,848 square km of degraded National Reserve Forest to the National Agricultural Land Reform Department to be distributed to forest dwellers. Under the Land Reform Act, non-transferable usufruct certificates were issued but they could be linked to loans from the Bank for Agriculture and Cooperatives,

While this program gradually defused a heated controversy between the RFD and millions of farm families who technically were illegally occupying national forest lands, many farmers have yet to obtain land rights. Also, during the period of rapid economic growth fuelled by a highly speculative real estate market, a significant amount of land allocated under the national Agricultural Land Reform Program ended up being acquired by well-to-do speculators (Kaosa-art et al. 2000). Repeated efforts to address these problems have been only partially successful.

Map 3: Population density and protected areas

Along with these three major programs, there were several cabinet resolutions during the late 1980s and early 1990s relating to forest dwellers in national forest reserves, for example, those concerned with Watershed Classification in 1985, National Forest Policy in 1985, Land Policy in 1987, Temporary settlement for illegal forest occupations 1989, Procedures to deal with People Settlement in Forest Land Area 1993, Strategies and Procedures to Solve Forest Land Conflicts 1997, and Procedures for Forest Land Conflict Resolutions according to National Forest Committee in 1998.

While the agricultural expansion policy contributed to the development of a large rural population and strong agricultural sector, the policy-induced settlement of previously unoccupied land exacerbated Thailand's rapid deforestation. In response, the government developed policies directed at protecting watersheds and forest lands. In some cases, watershed area settlements were re-settled from forest reserves to lowland areas. But opposition to the government's resettlement policies arose. Newly allotted lands were often relatively unproductive, and the new settlement sites did not permit farmers' access to supplementary livelihood resources from the forest. At the same time, resettlement of farmers (including ethnic minorities) from upland Forest Reserves opened these lands to illegal occupation by other, more powerful, private economic interests. The regions of relatively high poverty in Thailand are found in the northwest and northeast of the country with a small pocket in the far south (Map 4). In the north, poor communities and protected areas are especially closely linked.

By the 1980s and 90s, industrial development in Thailand rapidly transformed the country into one of Asia's boom economies. Poor farmers from the countryside were able to find employment in urban areas, and rural to urban migration increased rapidly. Initially, most farmers sought supplementary income from part-time wage labour during the dry, non-agricultural season. Later, an increasing number of farmers sold their land to pursue permanent employment in the cities, or developed farming methods that permitted them to spend increasing amounts of time in urban employment, returning only during critical crop production periods. The shift from rural to urban population concentrations tended to relieve some of the pressures on remaining forests. Community forest areas that had been exploited intensively for small timber and fuelwood were able to regenerate. The large-scale shift from fuelwood to electricity and natural gas also contributed significantly to forest regeneration.

Map 4: Poverty and protected areas

Part 2: Economic development, governance and protected areas

4 Structure of government and key areas of reform

4.1 Background to governance and administrative reforms

During the 1980s and 90s, Thailand experienced an unprecedented economic boom until being hit by the Asian financial crisis in 1997. The country had become one of the most rapidly developing economies in the world, with an aggregate GDP growth between 1980 and 2000 of 142 per cent (IMF 2001). The benefits from this economic boom were far from equitably spread. Well-to-do groups became extremely wealthy, while the majority of the poor remained that way.

At the height of the boom in 1992, allegations of widespread corruption in Thailand's democratically elected government led to a military coup. The spirit of democracy in Thailand had grown dramatically during the economic boom years, and a broad-based opposition voiced intense discontent with the military-installed government and new Constitution. Violent street protests forced the military government to resign. This victory for the Thai people and their democratic ideals has had a strong impact on Thailand's subsequent development.

The drafting of a new Constitution by the elected Drafting Constitution Assembly, mostly eminent members of Thai society, began after the overthrow of the military regime. In 1997, the enactment of Thailand's new "People's Constitution" and the closely associated National Government Decentralisation and Reform Acts in of 1998 and 1999 marked a new era in Thai governance and administrative reform.

4.2 Government reform, decentralisation and implications for protected area management

Increasing public concern about the environment, pressure to downsize government in the wake of the economic crisis, and the recognition that local people should play an active role in natural resources management have combined to impel Thailand toward decentralised natural resource and protected area management (Sato 1998).

The new Constitution provides a mandate for radical reform of the governance system, and for management and governance of rural natural resources with peoples' participation. The *Government Reform Act* aims to replace Thailand's inefficient centralised bureaucracy with a more efficient, integrated and decentralised system of administration.

Several articles in the new Constitution refer specifically to rural community responsibility to manage natural resources. These are reflected in the government reform process, which increasingly acknowledges the need for integrated and participatory natural resource management. The reforms endeavour to rectify past reliance on strictly sectoral and expert-designed resource management approaches. They also aim to resolve the many problems associated with overlapping and competing jurisdictions and mandates among some government agencies. The aim is to create an approach that

will be better suited for responding to, incorporating, and reconciling the needs and priorities of a range of involved stakeholders and interest groups (FAO 2000).

The new Constitution provides a framework and impetus to devolve development decision-making, budget planning and allocation to the nation's sub districts – the administrative locus closest to the country's grassroots (Tambon Administrative Organisations or TAOs). Supporting legislation and policy, including the'*Government Decentralisation Act* and *National Government Reform Act,* define specific mechanisms by which, between 2000 and 2003, authority for development and budget planning is to be devolved to the TAOs.

Thirty five per cent of the national income from taxation is earmarked for allocation to the newly constituted TAOs by 2004. The TAOs are at the epicentre of a sweeping decentralisation of administrative and decision-making powers. They will be charged with spearheading economic development through sustainable natural resource management.

The changes are to be supported by a reform of the nation's educational system in which locally designed curricula are tailored to specific conditions so as to be responsive to locally expressed needs and opportunities. This integrated system of local decision-making, capacity building and budget allocation is designed to support development of sustainable livelihoods, cultures, traditions and community-based environmental management. With restoration and maintenance of ecological integrity considered vital for economic development, decentralised governance aims to mobilise society by supporting rural resource management systems. These establish the foundation for national development based on conservation and sustainable use of natural resources.[3]

The plan to decentralise Thailand's governance system is at the pioneering edge of government reform and democratisation in South East Asia. A number of supporting factors are essential to make it work. Participants have begun to voice concerns that the same powerful political interests have surfaced in the election of the TAOs reflected in the emerging working styles of some of the organisations, their decision-making processes and sub-district development plans. Capacity building and strong technical backing is needed.

If properly implemented, government decentralisation under the socially progressive principles of Thailand's new Constitution promises to significantly improve the quality and effectiveness of the nation's rural development investments. Since the Eighth National and Social Development Plan (NESDP 1997-2001), the inclusion of eminent civil society representatives on the NESDP vetting committee has influenced a movement toward greater participation and input from a wide range of citizens and civil society groups. Institutional reforms at the central level have promoted the vision of a more participatory and inclusive system for collaborative natural resource and protected area management. A restructuring of agencies responsible for conservation and protected area management occurred in October 2002 with the establishment of the Ministry of Natural Resources and Environment.

4.3 Decentralisation of natural resource management: the new constitution and community forestry bill

Revised guidelines for the development and conservation of Thailand's natural resources took shape during the Sixth and Seventh NESDPs (1987-1996). They focused on decentralising management and administration of natural resources to the local level. Under the Seventh NESDP, natural resources and the environment were placed under the framework of rural development. The three main targets were: 1) to develop the quality of life of every household, 2) to increase income and employment opportunities, and,

3 For example, the "One Tambon One Product" program is assisting each subdistrict to develop high quality specialty products on which villagers can depend to generate additional income, with domestic and export marketing assistance from government.

3) to conserve natural resources and the environment through the participation of local communities and organisations.

An important basis for the design of decentralised natural resource management under the NESDP was the Ministry of Interior's successful National Rural Development Program (NRDP). This program employed decentralised and participatory rural development planning that focused on quality of life improvement, paying particular attention to poverty alleviation. Under efforts to decentralise natural resource management responsibilities, in 1992, Provincial Natural Resources and Environment Committees were established in every province and district in the country with representatives from all concerned government departments as members. These committees were charged with conducting environmental management needs assessments according to guidelines developed by MOI, the National Environment Board and the National Economic and Social Development Board (Agenda 212000). District plans were amalgamated at the province level and submitted to the central administration for scrutiny and budget approval. MONRE is now conducting a similar program on a pilot basis, with the geographic planning unit revised and expanded to cover entire river basins.

Yet, local development programs, based on people's participation in conservation, have not run smoothly. Conflicting interests in the management of natural resources by local people and forestry officials, and between and within departments, have created obstacles to establishing genuine collaborative natural resource management arrangements. The community regulations, social structures, traditional management practices and beliefs that encourage sustainable resource use were not widely recognised by government officials (Jamarik et al. 1994). This created conflicts between local communities and officials, and at the same time created opportunities for exploitation by outside interest groups, who have greater economic and legal power than rural communities (Yoddumnern-Attig 1999). MONRE has reoriented its departments' roles to promote and support peoples participation. This new orientation has reduced gaps and tensions.

The Eighth NESDP (1997-2001) emphasises human resource development as its main thrust. Many of its strategies focus on people's participation in national resource management using the TAOs as the focus for participatory planning and management. The basis for these efforts is Articles 46 and 79 of the Constitution. These, along with other supporting constitutional articles, require that local communities be enabled to play a substantive role in, and assume responsibilities for managing local natural resources. Because of the absence of specific details in the Constitution related to community resource management, a Draft Community Forestry Bill (CFB) was first prepared by the RFD and put before Parliament in 1991. Under the draft, the Department would focus on community forestry as the participatory mechanism in management of national reserve forest areas not included in a protected area. Some key NGOs and local people had a different expectation – that the bill would legalise community management of nearby forests including those within protected areas.

In 1998, civil society groups promulgated an alternative "people's" draft in response to those concerns. For the first time in history, the new Constitutional provision enabled citizens to propose laws by gathering 50,000 certified signatures.

The draft CFB has gone through several revisions and has had a contentious history. There remains doubt among some groups in government and in the conservation movement concerning the proposed declaration of community forest within or adjacent to a protected area. In 2002, the Lower House of Parliament passed the peoples' draft CFB. Subsequent scrutiny of the CFB by the Senate, however, led to the deletion of the key articles that aimed to legalise the declaration of community forest within protected areas. The CFB is currently under further consideration by Parliament, and most people believe it will soon be passed into law.

Once enacted, Thailand's Community Forestry Bill will provide critical guidelines, under which MONRE will need to engage rural communities and civil society in collaborative forest management. It could lead to similar rights being established in other natural resource sectors, including coastal fisheries and will provide a stimulus to the testing of joint management arrangements associated with protected areas.

Efforts over the past decade to link government reform and decentralisation to sustainable management of natural resources and protected areas have proven crucial for the ongoing process of democratisation and development of good governance in Thailand.

5 Economic development

5.1 National economic trends

In 1999, Thailand's GDP was 4,615,386 million baht (US$107.34 billion) measured in current prices. Per capita income was 74,675 baht (US$1,735) per year. The economy has grown rapidly in the last two decades. Until the Asian financial crisis of 1997-98, Gross Domestic Product (GDP) measured in constant 1988 prices was growing at an annual compound rate of eight per cent.

General trends and key characteristics of the national economy are evident in Table 1. The dominant sector has been manufacturing, which currently accounts for 36 per cent of GDP. Agriculture comprises only 10 per cent of GDP, indicating the successful transformation of Thailand from a predominantly rural economy to a modern industrialised country. Exports, particularly of manufactured products, have been a driving force for national development.

Table 1: Percentage contribution of sectors to Gross National Product: 1993 – 1999 (based on 1988 prices in million baht).

Industrial Origin	1993	1994	1995	1996	1997	1998	1999	2000
Agriculture	10.44	10.04	9.56	9.40	9.50	10.30	10.15	9.99
Agriculture, hunting and logging	8.60	8.19	7.84	7.79	7.95	8.53	8.52	8.42
Fishing	1.84	1.85	1.72	1.60	1.55	1.77	1.54	1.57
Non-Agriculture	89.56	89.96	90.44	90.60	90.50	89.70	89.85	90.01
Mining and quarrying	1.65	1.63	1.52	1.70	1.95	2.05	2.14	2.15
Manufacturing	31.61	31.73	32.48	32.68	33.63	33.50	35.84	36.35
Electricity, gas and water supply	2.52	2.56	2.68	2.66	2.85	3.13	3.12	3.30
Construction	6.09	6.38	6.24	6.30	4.71	3.22	2.92	2.53
Wholesale and retail trade	17.39	17.45	17.51	16.86	16.57	16.15	16.06	15.83
Hotels and restaurants	3.99	3.76	3.58	3.49	3.44	3.66	3.73	3.78
Transport, storage and communication	7.74	7.91	8.12	8.56	9.10	9.27	9.46	9.80
Financial intermediation	6.87	7.33	7.14	7.04	6.38	5.03	2.95	2.67
Real estate, renting and business activities	3.92	3.85	3.73	3.68	3.79	4.13	4.13	4.14
Public administration and defence compulsory social services	2.75	2.60	2.66	2.68	2.80	3.37	3.28	3.19
Education	2.37	2.22	2.24	2.20	2.37	2.93	2.86	2.82
Health and social work	1.08	1.05	1.04	1.04	1.15	1.36	1.32	1.38
Other community, social and personal service activities	1.44	1.36	1.38	1.60	1.67	1.77	1.91	1.96
Private household with employed persons	0.14	0.13	0.11	0.11	0.11	0.12	0.12	0.11
Gross Domestic Product	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

5.2 Overall performance

After enjoying the world's highest growth rate from 1985 to 1995 — averaging almost 9 per cent annually — increased speculative pressure on Thailand's currency in 1997 led to a crisis that uncovered financial sector weaknesses and forced the government to float the national currency (the baht). Long pegged at 25 to the dollar, the baht reached its lowest point, 56 to the dollar, in January 1998; the economy contracted by 10.2 per cent that year. Thailand entered a recovery stage in 1999, expanding 4.2 per cent. It grew about the same amount in 2000, largely due to strong exports, which increased 20 per cent that year. An ailing financial sector and the slow pace of corporate debt restructuring combined with a softening of global demand, slowed growth in 2001 (ODCI 2001).

5.3 Dependence of national economy on natural resources and PAs

Thailand is very dependent on its natural resources. Natural assets provide important environmental goods and services that underpin economic production and development. One of the most important sources of foreign exchange, for example, is tourism expenditure. According to statistics published by the Tourism Authority of Thailand, in 2000 there were 9,508,623 international visitors, accounting for expenditures of 285,540 million baht (US$6.64 billion). This expenditure is spread across various sectors, including hotels and restaurants, retail trade, and transport.

Some sectors rely directly on the natural environment for inputs to their production processes; for example, agriculture, fisheries, hydro-electricity and water supply. Other sectors are indirectly dependent on raw materials; for example, food processing; paper production, furniture and pharmaceutical products. Due to linkages between industries in the economy, effective planning and management of natural resources and ecosystems is essential to the health of most sectors. Protected areas are becoming the main form of tenure for managing these natural systems. Their preservation is critical to the long-term integrity and maintenance of the nation's natural resource endowments, and to the contribution of these endowments to economic development.

5.4 Poverty alleviation

Rapid economic development has helped achieve a significant reduction in poverty. The number of people living in poverty in Thailand fell significantly during the 20-year period from 1975 to 1995, from 3.4 million to less than 500,000 (Ahuja et al. 1997).

During the same period, however, inequality of income between urban and rural areas increased. The proportion of poor in rural areas rose to 92 per cent in 1992, while the Gini coefficients[1] increased from 35.7 to 45.4 (Ahuja et al. 1997). These inequalities are closely related to lack of educational opportunities and achievements. The Asian economic crisis created further poverty in Thailand, partly due to the lack of social services. Unemployment also increased as a result of the crisis.

4 The amount of inequality in income distribution

6 Economic planning

6.1 National development planning

Five-Year National Economic and Social Development Plans (NESDPs) guide the national development planning process in Thailand. The National Economic and Social Development Board formulates these plans in collaboration with relevant government agencies and with opportunities for input by civil society and the private sector. The draft NESDP is then considered by Parliament. Once satisfactorily revised and approved, the final plan is passed to His Majesty the King of Thailand for signature.

6.2 Budget process and allocations

The Ministry of Finance is responsible for fiscal policy and a key role in raising revenues for national budgets. National budget allocations to support development and other program areas are determined by the Budget Bureau, in consultation with line agencies. Once finalised by the Parliament, budgets are allocated to various agencies, which use the funds to implement their plans and programs in conformance with the objectives and provisions of the NESDP.

In 2002, RFD received an allocation of 6,707 million Baht (US$160 million), or 27.6 per cent of the entire budget allocation to government agencies. Funding for protected areas (3,441 million Baht) was about half of this allocation. In 2003, the RFD budget was 8,068 million Baht, with 4,816 million Baht for protected area management. However, the budget was readjusted with the splitting of RFD into two departments (RFD and DNWP).

6.3 Economic Performance by Sector

6.3.1 Energy

Thailand's domestic energy resources include small oil fields, large lignite deposits, natural gas (in the Gulf of Thailand), and hydro-power. The energy sector is undergoing a period of restructuring and privatisation. Thailand produces only about 20 per cent of its energy requirements from domestic fossil fuels and hydro-power. Of 750,000 barrels of oil consumed per day in 1996, 175,000 barrels per day were produced domestically (Energy Information Administration 2001). Petroleum products including crude oil and natural gas are imported into the country, as is hydro-electricity from Lao PDR. Thailand imports 1.02 billion kW of hydro-electricity from Lao PDR, and exports electricity back to Lao PDR in the amount of about 200 million kW per year due to infrastructure limitations in that country (ODCI 2001). In 1988, national electricity production in Thailand was 89.431 billion kWh, of which fossil fuels provided 91.17 per cent, hydro-power 3.81 per cent and 0.02 per cent from other sources (such as co-generation). Consumption was 83.991 billion kWh.

Since 1980, energy demand in Thailand has increased in parallel with rapid industrial development and the concurrent increase in household demands. While the trend of increasing energy demand was interrupted in the immediate aftermath of the Asian financial crisis, demand has picked up again as Thailand's economy begins to recover from the global economic slowdown. Thailand's GDP grew only 1 per

cent in 2000, and 1.8 per cent in 2001, with higher projections for 2002. Longer-term growth rates beyond 2002 are projected in the range of 4-5 per cent. Higher growth rates have implications for increased energy demand (EIA 2002). Intensifying public scrutiny of and opposition to proposed energy development projects, including hydro-power schemes, however, creates serious constraints on efforts by Thailand's Electricity Generating Authority (EGAT) to prepare to meet this demand.

6.3.2 Forestry

Thailand was once very richly endowed with forests, including a wide range of tropical and subtropical hardwood species. Many such as teak had high commercial value. Since the turn of the century, commercial forestry contributed significantly to Thailand's national revenues. Selective logging, using elephants to extract logs from the forests, availability of extensive lowland farming areas, and a relatively low population (23 million by 1950), all contributed to the kingdom's ability to maintain forest area at 60 per cent of total land area by 1953. But between 1954 and 1967, the government allocated forest lands for commercial exploitation with the expectation that forest revenues would be used to support national economic development. By 1968, 500 private timber-harvesting concessions covered half the country. Thailand's forest landscape was being rapidly and significantly transformed through logging. With the population also increasing rapidly during this period, and in response to government policy to increase agricultural exports, deforested areas were increasingly converted to agriculture. By 1973, forest cover had been reduced to 43 per cent, and to 25 per cent by 1998 (Table 10).

The seventh NESDP (1992-1996) required that the country maintain 25 per cent of its forest area under conservation status. In response, the area and number of protected areas has been increasing steadily since 1992. Meanwhile, since the enactment of the new Constitution in 1997, the principal of collaborative natural resource management has become the central focus for developing a new conceptual and implementation framework for forest management in Thailand.

6.3.3 Agriculture

Thailand's fertile and well-watered central plains have established the country as the "rice-bowl" of South East Asia. The cultivated area in Thailand is 20.8 million hectares, 11.9 million of which are used for growing rice, 6.7 million for upland crops, and 2.2 million for perennial crops. The country has become a major international exporter of agricultural crops and processed agricultural products, including rice, tropical fruits, animal feedstock, dried and canned fruits and vegetables. By 1988, agriculture contributed about 17 per cent of GNP and 34 per cent of Thailand's exports, while providing full or part-time employment for more than half of the country's labour force. Today, agricultural products are produced in such large quantities that the country ranks as the world's number one supplier of many commodities. Agriculture has provided a springboard for the rapid development of agro-processing industries with labour-intensive production and high foreign exchange earnings (Mahidol University Thailand Agriculture 2002).

6.3.4 Fisheries

Thailand's coastlines — on the Gulf of Thailand in the east and Andaman Sea in the west—– span a total of 2,624 km, with a

shelf area of 294,000 square km. Fish has long been the main staple food for Thai people, providing more than 50 per cent of the annual protein intake for the entire population.

Both the Andaman Sea and Gulf of Thailand are highly productive fishing grounds. Thailand's commercial fisheries industry has contributed significantly to national GDP; total production revenues were more than US$ 4 billion in 1998 (Globefish 2001). Capture fisheries outputs maintained steady growth over the past decade, but this has led to over-exploitation of fish stocks. While all aspects of fisheries continue to expand, they are expected to reach a plateau and may well begin to decline because of worsening resource scarcity.

Inland fisheries

Inland fisheries have long been a part of Thai culture. They are an open access resource for animal protein for the Thai rural population. Rivers and their tributaries, floodplains, lakes, swamps and reservoirs throughout the countries are important for inland fisheries. The production from inland capture fisheries in 1996 was about 208,400 tones (t). Despite habitat degradation and increased pollution from industrial wastes, inland capture fisheries production has continued to increase, but the rate of increase is slowing and could well decline if environmental conditions continue to deteriorate.

Aquaculture

Aquaculture has expanded rapidly since the late 1980s. Production increased more than fourfold, reaching 555,000 t in 1996, and contributed 15.6 per cent of overall value to total national fisheries production. Coastal brackish water aquaculture produced 326,000 t, worth US$1,050.73 million, while freshwater aquaculture yielded 228,700 t, valued at US$171.89 million (Mahidol University Agriculture 2002). Freshwater aquaculture is widely practised in most parts of the country, particularly in the central and northeastern areas. In 1996, there were 154,003 freshwater fish farms, with a total area of 63,000 ha, operating pond, paddy-*cum*-ditch, and cage fish culture. Annual inland aquaculture production has increased steadily to 228,700 t in 1996. The most commonly cultivated species are tilapia, catfish, local carp, gourami, and freshwater prawn. Thailand has become one of the world's major producers of marine shrimp. Production increased from 13,600 t in 1981 to 357,000 t in 1995 with 23,413 shrimp farms and a total area of 72,663 ha. 1996 production was worth US$1,250 million. An outbreak of disease in 1997 led to a decline in shrimp production to 228,000 t. The disease can be attributed to insufficient freshwater to buffer brackish water supplies and maintain optimal salinity levels.

6.3.5 Tourism

Thailand possesses a natural and cultural richness that has led to its being one of the world's major tourist destinations. The number of tourists coming to Thailand has grown rapidly, from 1.2 million in 1977 to 5.7 million in 1993. In 1996, an estimated 7.44 million international tourists visited Thailand; their collective expenditures of US$11.25 billion were the country's primary source of foreign exchange (TDRI 1997). The income accrued from tourism contributes substantially to the Thai economy. Now accounting for 5.4 per cent of GDP, it is higher than in any other ASEAN country except Singapore. Supplementing growing international tourism is an increase in the number of trips made by Thai tourists within the country. The rapid growth experienced by the Thai economy over the past two decades has been accompanied by an expansion of the country's middle class and a rise in domestic tourism. Domestic tourism is expected to soon account for a greater share of tourism-related expenditures within the kingdom than its foreign counterpart. The number of in-country trips made by Thai tourists in 1996 totalled approximately 42.5 million and projections suggest that this figure will more than double to 97 million by the year 2003 (TDRI 1997).

6.3.6 Water resources

Annual rainfall storage in Thailand averages only 30 per cent of rainfall volume, with 70 to 80 per cent concentrated during the four rainy months. As the population increases and industry continues to expand, runoff per capita is decreasing steadily, and will continue to do so. Dry-season flows are critical, since it is during the dry months that the existing water deficits are pronounced. This situation will worsen over time. Efforts to increase water availability focus, therefore, on improving dry-season flows.

Global predictions regarding water availability and management suggest that many countries will face serious water shortages in the coming decades. Thailand already suffers water shortages and periods of drought. Given the projected increasing water demand, Thailand could face critical water shortages if runoff amounts and storage capacity remain at their current levels (Somkiat 2002).

To establish a basis for improved water management Thailand has been divided into 25 river basin areas according to topography and main drainage basin location. The river basin has become the fundamental unit for national water resource planning and, potentially, for other natural resources.

6.4 Integration of natural resource conservation with development planning

After two decades of rapid economic development in Thailand, a crucial lesson learned is that proper planning and management of natural resources and the environment are a vital responsibility for each economic development sector. Environmental degradation caused by one sector has spilled over to others, posing constraints on their development and sustainable production.

Individual development sectors must appreciate the full value of the resources and natural systems they depend on for production, and take action to protect and improve those values. Protection and rehabilitation strategies in each sector will have productivity impacts across all sectors of the economy.

NESDPs are the main vehicle for integrating policies and planning for natural resources and the environment at the national level. Specific policies and plans were introduced in the Sixth NESDP (1987-1991) and have been continued in the Seventh NESDP. Natural resource management is not well integrated in sectoral planning; separate line ministries have this responsibility with respect to their own sectors, but cross-sectoral natural resource and environmental management is not well coordinated. Divergences emerge between agencies with different responsibilities, objectives and priorities for managing the environment, including accounting for protected areas in sectoral development plans and investment appraisals.

A framework for environmental conservation has been established under the Policy and Prospective Plan for National Environmental Quality Enhancement and Protection (1997-2016). An Environmental Management Plan (1999-2006) has also been completed and adopted. Projects outside the Management Plan are not allocated funds (Kaosa-ard and Wijuskprasert 2000).

Natural resource and environmental management is one of seven strategies of the 9th NESDP. It includes the following provisions:

1. *Upgrade the efficiency of natural resource and environmental management in support of conservation, and rehabilitate and develop the grassroots economy*. To this end, existing mechanisms for natural resources and environmental management should be adjusted to emphasise local participation. Public environmental awareness needs to be enhanced, together with more effective enforcement of laws. Databases at the local level should be established to facilitate efficient monitoring and evaluation.
2. *Preservation and rehabilitation of natural resources*. Action should be taken to protect and demarcate preservation and conservation areas in order to maintain ecosystem balance and promote land use

consistent with capability and best use. A master plan for the rehabilitation of Thai coastal and marine environments should be formulated. Nationwide, natural resource strategies should stress preservation of biodiversity, efficient utilisation of water resources, and the restoration of soil fertility to support increased agricultural productivity, as well as conservation and more efficient energy use.

3. *Rehabilitation and preservation of community surroundings, art and culture, as well as tourist attractions, to enhance the quality of life and the local economy*. Resources should be focused on development of waste disposal systems that are acceptable to communities. Pollution abatement requires strict law enforcement, the adoption of appropriate technologies, and the adjustment of environmental standards to international levels.
4. *Efficient pollution abatement management conducive to the development of liveable cities and communities*. Resources should be focused on development of waste disposal systems that acceptable to communities. Pollution abatement requires strict law enforcement, the adoption of appropriate technologies, and the upward adjustment of environmental standards to international levels.

To maintain ecosystem balance and promote land use consistent with capability and best use, the 9th Plan targets at least 25 per cent of the kingdom for conserved forest areas and at least 1.25 million rai (nearly 2 million hectares) as conserved mangrove area. To these ends, the plan includes five important guidelines.

1. Verify demarcated Class I watersheds and declare the boundaries of all conserved and protected areas. Completely demarcate conserved forest and mangrove areas, including important buffer zone areas. Establish mechanisms and networks for conservation forest management in order to reduce conflicts between government and rural people by applying the principles of efficiency and participatory approaches.
2. Encourage rural communities to participate in forest rehabilitation and planting along with government including efficient community forestry management initiatives.
3. Declare plant preservation and aquatic animal conservation areas. Clearly designate boundaries and measures for traditional fisheries preservation.
4. Demarcate appropriate land-use areas for agriculture, encouraging intensive measures through credit, tax and marketing systems in order to distribute land rights for agricultural areas not currently used for agricultural purposes. Encourage financial mechanisms to lease transfer these lands to farmers for agricultural activities.
5. Establish a natural protected areas system for conservation and designate measures for maintaining ecosystem protection, especially for large forest expanses and wetlands.

6.5 Reforms in development planning and budgeting

The *Decentralisation Act* and the *National Government Reform Act* will devolve significant authority for budget planning and development to the *tambons* or sub-districts. Thirty-five per cent of the national income through taxation will be allocated to the newly constituted TAOs. Government will apply the reforms in a manner that enables the improvement of natural resource management through integrated and participatory approaches.

Part 3: Natural resource management and protected areas

7 Natural resources management

Managing natural resources is a complex matter, with responsibility shared by a number of ministries and departments. Principal among these are the Ministry of Agriculture and Cooperatives (MOAC), under which are the Department of Agriculture, Department of Land Development, Department of Fisheries, and the Agricultural Land Reform Office. The new Ministry of Natural Resources and Environment includes three main administrative "clusters": the environment cluster, covering pollution and environmental quality control; the inland water resources cluster; and the natural resources works cluster; covering protected areas, forestry, coastal and marine conservation and mineral development, managed by, for example, the Department of National Park, Wildlife, and Plant Conservation, Royal Forest Department, Department of Water Resources, Department of Mineral Resources, and Department of Coastal and Marine Resources.

The National Environment Board and the Office for Environmental Policy and Planning (OEPP) have also been moved to MONRE. OEPP then became the Office of Natural Resources and Environmental Policy and Planning (ONEP). The National Environment Board is responsible for delivering policy recommendations to the National Economic and Social Development Board, which incorporates these recommendations into its five-year National Economic and Social Development Plans. Environmental policies stipulated in the NESDPs are translated into action plans by the various ministries and their constituent departments.

Following the government restructuring, the Ministry of Interior, Community Development Department and Department of Local Administrative have been more active in efforts to help local communities develop integrated sustainable resource management systems. The Royal Project Foundation has been developing arrangements under which local communities and the environment can coexist harmoniously.

Local communities living within the country's natural resource systems are ultimately engaged in managing them, both outside and, in many cases, inside protected areas. A large number of environmental NGOs have been assisting local communities to implement integrated conservation and development projects (ICDPs). Increasingly, using national governance reforms rooted in a number of constitutional articles and mandates, the role of local people in managing natural resources in Thailand is being promoted by civil society and legitimised by law.

7.1 Thailand's land classification system

There is no clear boundary between land use classification and land cover (though national experts generally agree that the distinction should be drawn; see, for example, Land Development Department 2000). The newest 1:1,000,000 land-use maps produced by the Land Development Department (MOAC) in 1998 show 17 national land use classification categories, shown in Table 2 and Map 5.

Map 5: Land use and protected areas

Table 2: Land uses as a percentage of total land area in Thailand

Land use / land cover category	Per cent of total land area
Paddy field	13.78
Field crops	7.72
Perennial crops	20.49
Plantation crops.	4.18
Horticulture	2.41
Swidden (shifting) cultivation	3.28
Pasture land (inclusive of farm houses)	2.67
Aquaculture	2.97
Evergreen forest	13.04
Deciduous forest	11.41
Forest plantation	3.05
Rangeland	2.63
Wetland	2.91
Mines	1.78
Urban area	1.67
Water bodies	4.47
Other	1.55

Source: Land Development Department 2000.

7.2 Forest classification

Following the logging ban that was declared in 1989 and made permanent in 1992, the Seventh NESDP confirmed the National Forest Policy to reverse the proposed ratio of conservation to economic forest area, making the objective for conservation forest 25 per cent of land cover, and economic (production) forest 15 per cent. This policy was reiterated in the Eighth NESDP for 1997-2001 (NESDB 1997).

In 1992, in compliance with the Plan and the increasing challenge of resettlement, the RFD divided the national forest reserve estate into three zones (Jintanakul 1998). Division and mapping were done using infrared satellite imagery.

The **Conservation Forest Zone** (Zone C) is unsuitable for agriculture and covers existing protected forest areas and areas of natural forest minimally affected by human activity. Some of this area especially in the Northern watersheds remains occupied by permanent agriculture, shifting cultivation and associated human settlements. The **Economic Forest Zone** (Zone E) was set aside from arable land suitable for commercial tree plantations for distribution to landless farmers. The E-zone is often devoid of forest and some has been under cultivation for well over a decade. Some E-zone lands are in degraded forest areas. The **Agricultural Zone** (Zone A) portion of the national forest reserve estate was set aside expressly in deforested areas deemed suitable for agriculture. These areas are in the process of being allocated to farmers by the Agricultural Land Reform Office (ALRO). Transfer of land from the national forest estate to ALRO is accompanied by transfer of management responsibility.

In 1993, based on this zoning system, RFD transferred 70,848 square km from Zone A and a portion from Zone E to the Agricultural Land Reform Office (ALRO) for issuing forest dwellers Sor Por Kor- Rigth titles to cultivate to a maximum of 100 rai. Transfer of land from the national forest reserve estate to ALRO was accompanied with transfer of management responsibility. In 2002, ALRO transferred back to RFD areas that proved to be unsuitable for agriculture.

Zone C is the responsibility of the Department of National Park, Wildlife and Plant Conservation within MONRE. It covers national parks, wildlife sanctuaries, class I watersheds watersheds, forest parks, and a number of other conservation designations (Box 1).

Box 1: Components of Thailand's Protected Area System

Under the *Wildlife Protection and Reservation Act* (revised 1992), and the *National Parks Act* of 1961, a number of conservation areas are defined as comprising Thailand's Protected Area Estate, as follows:

National Park: Area with beautiful landscape, rare plants or animals, important history, preserved in its natural state for public education and enjoyment.

Wildlife Sanctuary: Preserved so that wild animal species can be preserved and bred in a natural environment.

Non-hunting area: Preserved for the protection of specific wildlife species but too small to be a national wildlife sanctuary.

Other categories of forest protected areas which have no specific legislation, but fall under the National Reserve Forest Act 1964 include:

Biosphere reserve: To conserve the integrity and genetic diversity of plant and animal communities within natural ecosystems.

Class I Watershed: Preserved under natural forest cover to protect critical watershed headwaters including Class 1 A and 1 B.

Botanical gardens: Collections of indigenous and exotic plant species for research and ex-situ conservation.

Arboreta: Smaller than botanical gardens for collections of various plant species, particularly flowering plants with economic value.

Conserved Mangroves: excluded from utilisation to protect marine flora and fauna.

Forest Park: Preserved for its natural scenic and public recreation value but too small to be a national park.

Under the Environmental Enhancement and Promotion Act 1992, there is one type of protected area **– National Environmental Conservation Area:** covering land, mountains, swamps and areas of interesting morphology that should be protected from economic and social exploitation.

Technically C zones are protected from all human use and settlement. In reality, a significant number of people have lived in these areas prior to their gazettal and there has been further encroachment subsequent to designation. Throughout the 1990s, it was estimated that as many 11 million people representing over 20 per cent of Thailand's 56,000 villages were living in designated National Forest Reserves (Gray et al. 1991). The contradiction between the history of human settlement in protected areas and the strict legal prohibitions on use and occupancy has been the focus of national controversy for some time.

7.3 Land tenure

Before 1900, the king owned all of the land in what was then known as Siam, from which he made grants to nobles, officials, and other free subjects. Land grants could be passed on to heirs, mortgaged or sold. At that time, when Thailand's land to population ratio was still high, land could also be cleared and used by farmers who, after three years of continuous cultivation, established an informal land claim. The concept of individual land ownership was introduced during the reign of King Chulalongkorn (Rama V, 1868-1910). Beginning in 1901, formal titles could be acquired. Later, land titling was controlled under the Land Law of 1954. Under this law, eight hectares was the maximum permissible holding (except where proof could be provided that the owner could manage a larger parcel).

A title deed *(chanod tidin)* giving unrestricted ownership rights was issued only after a cadastral survey. Application was first made to occupy and cultivate a piece of unused land, and a temporary occupancy permit (*bai chong* or reserve licence) carrying no title rights was issued. After 75 per cent of the land had been cultivated, the landholder could secure an exploitation testimonial (*nor sor*). This gave the right to occupy the land permanently and pass the property on to heirs. In effect, it was an assurance that a title deed eventually would be forthcoming. In the case of squatters, a special occupancy permit (*sor kor*) could also be obtained, unless the land was in a permanent reserved forest or otherwise intended for public use. Table 3 shows the current form and extent of land titles in the country.

Table 3: Per cent of national land area under title

Title type	1997	1999	2001
Chanod tidin	15.78	20.06	22.06
Nor Sor	20.44	18.90	16.57
Bai Chong	1.31	1.18	1.14
Total % of tenure	37.53	40.14	39.77

Source: NESDB 2003

By the 1960s, the total number of title deeds for agricultural land had reached one million, although there were 3.4 million agricultural households (with an unknown number of tenants). In the 1970s, to expedite the processing of title deeds, the Department of Land, Ministry of Interior resorted to using aerial photography in lieu of land surveys. By 1976 farm holdings with formal title were estimated at about 60 per cent of total holdings. The lack of full title on the part of the remaining 40 per cent created insecurity for the landholders and was a barrier to securing agricultural credit.

An unknown but substantial number of holdings had been established by squatters in the National Reserve Forests both prior to and following gazettal. According to the central government, these lands were not eligible for titling though the de facto possession of such holdings was recognised by local authorities. In some cases of forest encroachment, occupied land was incorrectly classified and in fact was cleared and suitable for cultivation. Accordingly, some reclassification was done in the late 1970s. Also, it appeared that in the drafting of the country's land laws, there was an underlying assumption that agricultural land meant lowlands only. Any land located in mountainous areas,

even including inter-montane valleys, was considered non-cultivable. Thus, most of the mountainous north of the country was excluded from the land registration system, and hill peoples resident in this region for decades —in some cases, centuries — were unable to acquire legal title to their lands (TDRI 1987).

7.4 Land reform

The civilian cabinet that succeeded to power in October 1973 promised reforms to rent and landuse. This did not happen, however, and farmer dissatisfaction mounted. Finally, in May and June of 1974, it erupted in street demonstrations. In December of that year, the government passed a reform law known as the Agricultural Land Rent Control Act of 1974. The Act provided for six-year, indefinitely renewable, land rental contracts.

Associated with the problem of land tenancy was the equally serious problem of "landlessness". In January 1975, despite strong opposition, the civilian government managed to get through the National Assembly a second, potentially far-reaching, reform measure. The Agricultural Land Reform Act of 1975 called for establishing the Agricultural Land Reform Office (ALRO) in the Ministry of Agriculture and Cooperatives. The ALRO was authorised to allocate up to eight hectares of land to landless and tenant farmers to be paid for on a long-term instalment basis. The land to be allocated was to come from purchases from private holders and from forest and crown lands. By early 1979, almost 80 areas throughout the country had been designated Land Reform Areas under the program (TDRI 1987).

At the same time a different concept of land reform emerged focusing on the large numbers of illegal squatters in National Forest Reserves. Land reform in areas of high tenancy was strongly opposed by large land owners, including wealthy aristocrats, business people, and senior military officers. The new goal of helping squatters on National Forest Reserve land appeared more readily achievable. This program furnished legal usufruct titles called Sor Por Kor (SPK) 4-01. The SPK titles have replaced the RFD's Sor Tor Kor (right to farm) which were issued under the National Forest Reserve Act 1964. Following the 1992 transfer of degraded forest reserve to ALRO, the work to issue titles, and manage and monitor the utilization of the land for agriculture cultivation continued under the Agricultural Land Rent Control Act 1974. To 2002, the SPK program has resolved the tenure arrangements for 889,955 families who once lived illegally in national forest reserve areas (Table 4).

Table 4: Issuance of SPK 4-01 usufruct titles

Year	Area/Number of households	Central	Northern	Northeastern	Southern	Total
1997	Area (sq.km)	406	596	1469	138	2608
	Households	12609	32435	53550	6536	111,130
1998	Area (sq.km)	363	593	1438	455	2845
	Households	12,356	30,233	56,235	19,041	117,865
1999	Area (sq.km)	360	716	2251	431	3758
	Households	11,697	32,361	85,762	18,616	148,436
2000	Area (sq.km)	360	1136	2352	399	4246
	Households	11,916	49,872	90,793	18,991	171,572
2001	Area (sq.km)	486	971	2186	383	4027
	Households	16,548	43,287	91,125	17,850	168,810
2002	Area (sq.km)	357	932	2241	335	3865
	Households	13,311	42,269	100,369	16,193	172142

Source: NESDB 2003

7.5 Multiple use as a viable protected area management regime

In general, Thailand's definition of protected area categories does not include the potential for multiple sustainable use as a means to reconcile local community needs with national conservation interests. Legally, all human use of protected areas for purposes other than recreation or research is strictly prohibited. The exception is in Biosphere Reserves and at Ramsar sites where sustainable use regimes are managed in the context of integrated conservation and development. Yet, those two protected area types have not been fully understood or appropriately managed by relevant stakeholders.

In reality, most protected areas have a long history of prior human settlement, cultivation and use. One response to resolving the tension between conservation management objectives and the settlements has been attempts to resettle enclave communities, or to strictly prohibit use of non-timber forest products even where communities have long depended on them for subsistence and livelihood. Efforts to exclude human uses of protected areas brought RFD into direct confrontation with the rural poor. This is one of two major issues that have challenged the PA authorities over the past several decades. The second is control of commercial resource exploitation including land encroachment and timber cutting.

Recent recognition of the need to explore multiple use approaches in PAs has led to collaboration on integrated buffer zone development and community-based sustainable resource management. This has mostly been negotiated at the provincial level. Elements of these systems are legitimised under the draft Community Forestry Bill. Collaborative management regimes of these kinds allow for designated uses by local communities in exchange for stakeholder commitments to protect conservation core zones. Under such arrangements, PAs are zoned for varying intensities of protection and use under strictly controlled and monitored conditions. Core zones are set aside for strict conservation.

There is now a range of examples of collaborative management approaches throughout Thailand:

- The MONRE-assisted integrated watershed management projects (for example, in the Doi Sam Muen and Upper Nan region).
- DNWP pilots in six national parks to promote joint protected area management with local communities
- Creating and supporting Provincial Conservation Forums in 6 provinces located in the Western Forest Complex.
- A pilot integrated River Basin Conservation and Development Project in the Upper Northeast implemented by MOSTE.
- Integrated coastal and marine resource protection being explored by the Department of Fisheries and begun through integrated multiple use and conservation.
- Traditional community resource management practised among watershed management associations in the north (Jamarik et al. 1994).
- Projects associated with the Royal Project Foundation.
- Various NGO and local community supported projects, for example, the Pattani Bay Conservation Project in southern Thailand, the Phu Khieo Integrated Conservation and Development Buffer Zone Project in the northeast, and the Phai Sali Integrated Livelihood Development and Environmental Conservation Project in the lower north-west.

8. Protected areas and environmental policy

8.1 National environmental policy

In 1992, Thailand's revised *Enhancement and Conservation of Environmental Quality Act* established the National Environment Board (NEB) under the Ministry of Science, Technology and Environment to improve Thailand's environmental laws and submit environmental quality standards and policies to the cabinet for approval. The National Environment Board is further empowered to oversee environmental impact assessments of those development projects with the potential to cause serious environmental impacts.

In June 1993, the National Committee on the Conservation of Biological Diversity (NCCBD) was created under the NEB. This committee formulates plans to implement national commitments to the Convention on Biological Diversity, including the National Policies, Measures and Plans on the Conservation and Sustainable Utilisation of Biodiversity (1998-2002). The committee also coordinates the responsibilities of other biodiversity committees under a number of departments, including RFD, the Department of Fisheries and the Department of Agriculture (Bugna and Rambaldi 2001). Following the government restructuring of 2002, ONEP under supervision of MONRE acts as the secretariat of the NEB.

8.1.1 National Biodiversity Strategy and Action Plan (NBSAP) preparation

Thailand finally ratified the Convention on Biological Diversity in September 2003. It had signed the CBD in 1992 with Cabinet approving ratification in 1997. Yet, accession to the Convention was delayed by concerns over the access it might provide signatory countries to Thailand's biodiversity resources (Vivajsirin et al. 2001). Accommodating the different perspectives on the CBD's implications for national sovereignty was put to the National Constitutional Court. In late 2000 the Court decided that ratification must be based on an Act of Parliament.

Despite the delays in ratification, the NCCBD went ahead and established a working group to draft a national strategy on biodiversity as required under the Convention. The working group drew from the extensive research undertaken when the 1995 biodiversity status report was prepared. For the first time, the 1995 report gathered information on the plants and animals of the country, and its genetic resources and ecosystems, much of which was unpublished. The report also reviewed conservation activities that had been undertaken up to that time and assessed the capacity of institutions and human resources in the field. The Biodiversity Data Management Project extended the analysis of institutional capacity in managing information systems, and developed guidelines and plans for its improvement. The project established an effective network for sharing information between institutions within and outside the country. All this was fed into NBSAP formulation (Vivajsirin et al. 2001).

At that time, OEPP requested all relevant agencies to submit projects for implementation under NBSAP. This helped accelerate awareness within government agencies about the importance of the CBD. Many meetings and workshops were held to revise and assess project proposals and integrate them into the national strategy and action plan. Finally, the first draft of the NBSAP was submitted to a panel of over 100 experts from both governmental agencies and private organisations for review. The recommendations from

the panel meeting were integrated into a second draft NBSAP before submission to the National Committee, the National Environment Board and the Cabinet, respectively, for approval. In July 1997, Cabinet approved the NBSAP (technically, the National Policies, Measures and Plans on the Conservation and Sustainable Utilisation of Biodiversity 1998-2002) as an administrative framework for implementation (Vivajsirin et al. 2001). Since OEPP (now ONEP) transferred to MONRE, all the NBSAP activities now fall within the Ministry.

8.1.2 NBSAP aims and principles

The overall aim of the NBSAP is "to ensure that biodiversity activities coincide with national interests and prioritise actions required for achieving the objectives of the CBD". The target is to be met through seven strategies, which must adhere to a set of implementing "principles":

- Conserve biodiversity through in-situ and ex-situ approaches.
- Prevent and solve problems leading to the loss of biodiversity.
- Promote and facilitate cooperation in the conservation of biodiversity among responsible agencies, conservation groups, communities, as well as resources users.
- Recognise the importance of preserving indigenous knowledge, creativity and traditions as a first priority for conservation and sustainable use of biodiversity.
- Promote as a matter of urgency greater public education, capacity building for existing staff, and the training of staff for research and education in biodiversity.
- Consider and make decisions on the use and sharing of biodiversity resources in a fair and transparent manner and in a way that leads to sustainable and equitable uses.
- Undertake practical conservation measures concurrent with the monitoring and inventory of biodiversity resources.
- Ensure that activities for the conservation and sustainable use of biodiversity resources are consistent with national and international law.

While not explicit in the principles, a central approach of the NBSAP is to work within and through the budgets and resources of the sector agencies with responsibilities for the use of biodiversity resources. The NBSAP looks first at what can be achieved by making modifications to existing programs and approaches. This is done for two reasons. First, it is best to build on what is already in place. New institutions and programs will be needed, but the greatest opportunities for integration come from exploring opportunities for improving activities that already have staff and budgets. Second, it is necessary to be realistic about the prospects for additional funding in situations of scarce resources and economic constraints. The chances of receiving substantial increases in resources from government are slim. Given the Global Environment Facility's precondition of CBD ratification, funding from this important source is now open to Thailand.

8.1.3 NBSAP priorities for implementation

Seven NBSAP strategies are ranked in order of priority. Each strategy has one to five objectives, and each objective is met through a series of "measures" under which fall detailed implementation activities. The objectives, measures and activities for each strategy are of equal importance and are given a similar timeframe for implementation. Certain activities marked for implementation at a later stage logically follow the completion of prerequisite activities.

The strategies of the NBSAP, in order of importance, are:

1. Build capacity of institutions and their staff in the conservation of biodiversity;
2. Enhance the efficiency of protected areas management to ensure protection and sustainable use of biodiversity;

3. Improve incentives for conservation at the local level;
4. Conserve species, populations and ecosystems;
5. Control and monitor processes and activities that threaten existence and richness of biodiversity;
6. Promote management of biodiversity in urban, rural and traditional cultural environments; and
7. Promote cooperation between international and national institutions in the conservation and sustainable use of biodiversity.

Among the strategies, strengthening institutional capacity was identified as the most critical. In 2001, there were fourteen Acts, two cabinet resolutions, five national plans and policies (including the NBSAP) and two departmental regulations related to the conservation of biodiversity. Thus, limited achievement in conserving biodiversity is not due to inadequate legislation, but rather to a lack of efficient capacity to enforce and implement provisions of the existing laws and regulations. Without progressing on the first strategy to improve skills and capacities, it will be difficult to achieve the goals set out in the remaining strategies.

With some of the most important biodiversity resources now within protected areas, sound management of this national estate was considered the next most important strategy. Four objectives under this strategy seek an extension of the national system to adequately cover rare and endangered species and ecosystems; emphasise sustainable use of resources in and around protected areas; enhance skills and management capacity; and strengthen laws, resources and boundaries that support management.

Other high-priority strategies emphasise the increasing participation of local populations, enhancing knowledge of biological resources, and monitoring and controlling the effects of human activities. Although lower priority is given to certain social aspects of biodiversity management and cooperation with international entities, this does not indicate a lack of commitment to them. These issues were not considered as critical needs in the early stage of implementation, but they are nevertheless important long-term components of the NBSAP and will receive increasing attention as progress is made in implementing higher-priority strategies.

8.1.4 Thailand Biodiversity Centre

A Prime Ministerial Regulation in January 2000 established an autonomous government body, the Thailand Biodiversity Center (TBC), under the umbrella of the National Science and Technology Development Agency (NSTDA). Under the TBC, the NCCBD, reconstituted as the National Committee on the Conservation and Utilisation of Biodiversity (NCCUB), serves as a policy board linked to the National Committee on Environment (NCE). The Prime Minister chairs the NCE and the NCCUB is chaired by the Deputy Prime Minister in charge of environmental matters.

The NCCUB is required to:

- Determine trends and policies, regulations and plans for the conservation and utilisation of biological diversity to the Cabinet.
- Deliver opinion to the Cabinet regarding plans or projects with respect to conservation and utilisation of biological diversity.
- Promulgate and stipulate rules and procedures regarding access to biological resources, benefit sharing, bio-safety, and technology transfer.

- Deal with policy, administrative, and legal aspects in order for Thailand to conserve and utilize biological diversity in accordance with the concept and objective of the United Nations Convention on Biological Diversity.

The TBC acts as secretariat to the NCCUB with the following responsibilities:

- Coordinate with other government agencies in preparing trends and policies regulations or plans with respect to conservation and utilisation of biological diversity.
- Coordinate with educational government agencies in education, analysis and research on problems and obstacles occurring from the conservation and utilisation of biological diversity.
- Coordinate and work with other government agencies in negotiation of equitable conditions imposed on foreign organisations concerning access to biological resources, benefit sharing, and technology transfer.
- Support and assist government, private sectors, and educational institutions in research and development relating to conservation and utilisation of biological resources.
- Explore, collect, and service basic data and information regarding biological diversity domestically and internationally.
- Coordinate bio-safety management so as to be in accordance with international practices and inspecting and advising in respect of academic issues, setting regulations, standards, or guidelines for the assessment and management of risks pertaining to biosafety issues.

The TBC was dissolved in the government restructure of 2002. Its roles and functions have been allocated to MONRE. The establishment of a coordinating office either within the MONRE or as an independent organisation is under consideration.

8.2 Protected areas and the national development plans

The Royal Forest Department (RFD) was established in 1896. In 1900, the government promulgated a law governing the conservation of wild elephants, the first wildlife species to be protected. In the early 1940s, the deteriorating condition of the forests — along with examples set by the U.S. and Canada in the conservation of natural heritage — brought about a heightened awareness of nature conservation in Thailand. In 1941, the *Forestry Act* was passed.

In 1958, the Ministers of Agriculture and the Interior were directed to establish national parks and other protected areas and to draft their enabling legislation. In 1959, the Cabinet established the National Park and Wild Animals Reservation and Protection Committees, and with the assistance of IUCN and the U.S. National Park Service, 14 sites were selected to become national parks. In 1960, the *Wild Animals Reservation and Protection Act* was passed, and in 1961, the *National Parks Act*.

The five-year National Economic and Social Development Plans (NESDP) were launched in 1961. The progress in achieving conservation through protected areas during each of the first nine planning periods can be summarised as follows:

First NESDP (1961- 66). Starting with the Khao Yai National Park in 1962 and the Salak Phra Wildlife Sanctuary in 1965, four national parks, a wildlife sanctuary, and seven forest parks were established, covering about one per cent of the country. The National Park Section became a subdivision of the Royal Forest Department. The forest declined from 54.6 per cent of total land area to 51 per cent.

Second NESDP (1967-71). No national park or wildlife sanctuary was added to the national protected areas system. Forest cover declined to 42 per cent.

Third NESDP (1972-76). To arrest the decline of forest cover, the establishment of protected areas was accelerated. The government declared nine national parks, 11 wildlife sanctuaries, nine non-hunting areas, and six forest parks, covering 4.9 per cent of the country. One biosphere reserve was declared. The National Park and Wildlife Sanctuary Subdivision became two separate divisions. Forest cover further declined to 38.7 per cent.

Fourth NESDP (1977-81). The protected area system increased to 20 national parks, 12 wildlife sanctuaries, 13 non-hunting areas, and 22 forest parks, and included two biosphere reserves. The extent of the protected areas increased to 6.9 per cent of the country, and a target of 40 per cent forest cover was set, but forested area declined to only 30 per cent of the country.

Fifth NESDP (1982-86). During this period, 19 national parks, four wildlife sanctuaries, ten non-hunting areas, and 11 forest parks were added to the protected area system, bringing the total area to 10.2 per cent of the country. By the end of the period, only 29 per cent of the country was covered in forest.

Sixth NESDP (1987-91). During this period, 14 national parks, five wildlife sanctuaries, seven non-hunting areas, and one forest park were established. The Management Plan for Khao Yai National Park was prepared for implementation in 1987-1990 as a model for park management. The preparation of the management plan for the Tarutao Marine Park followed. The two planning projects generated funding support for the plan formulation of 23 other protected areas, and an Office for Protected Area Planning Projects was established within RFD. The other significant developments that occurred during this period included:

- The nationwide ban on logging in 1989.
- The first conference on biodiversity in 1989.
- The initiation of forest zoning in 1989.
- The approval by Cabinet of 263 national conservation areas in 1989.
- The approval by cabinet of measures for managing mangrove forests and coral reefs in 1991.
- The declaration of Huai Kha Khaeng-Thung Yai Naresuan as a Natural World Heritage Site by UNESCO.
- The decline in forest cover to only 26.64 per cent of the country.
- The National Forest Policy declares that forest areas should cover 40 per cent of the total country divided into conservation forest (25 per cent) and economic forest (15 per cent).

Seventh NESDP (1992-96). Adopted the recommendation of 40 per cent forest area, and increased the target for conservation forest to 25 per cent of the country. During 1992-1993, 11 national parks and three wildlife sanctuaries were established.

Eight NESDP (1997-2001). Confirmed the 25 per cent conservation forest target and 1.2 million rai of mangrove forest under protection. Stipulated that existing forest areas of the country will be preserved and considered to be the protected area system. In 2001, there were 75 national parks, 55 wildlife sanctuaries and 21 marine national parks, with total area of 43,118, 35,751 and 7,219 square km respectively. In addition, 39 national parks, four wildlife sanctuaries and six marine national parks are planned for the near future.

Ninth NESDP (2002-2006). Based on the forest area assessment of 2000, forests covered about 172,050 square km or 33.44 per cent of total land area. It was agreed that at least 25 per cent of the forested area should be maintained under the protected area system.

The number and area of various categories within the national protected area system is changing rapidly, with ongoing additions and expansions aimed at increasing the conservation area to 25 per cent of Thailand's total land area. As of July 2002 there were 81 terrestrial national parks and 21 designated marine national parks, 55 wildlife sanctuaries and 55 non-hunting areas. A further 38 reserves are scheduled to be gazetted as terrestrial national parks and six marine national parks are proposed.

The types of protected areas in the national system equate to the following IUCN PA management categories

Wildlife sanctuaries	IUCN Category I
National parks and national marine parks	IUCN Category II
Forest parks	IUCN Category V
Protected watersheds and non hunting areas	IUCN Category VI

Where the IUCN categories are defined as follows (Box 2):

Box 2: The IUCN system of protected areas categories

I Strict Nature Reserve/Wilderness Area. Areas of land and/or sea possessing outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring; or large areas of unmodified or slightly modified land, and/or sea, retaining their natural character and influence, without permanent or significant habitation, which are protected and managed so as to preserve their natural condition.

II National Park: Protected Areas Managed Mainly for Ecosystem Conservation and Recreation. Natural areas of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for this and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area, and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

III Natural Monument: Protected Areas Managed Mainly for Conservation of Specific Features. Areas containing one or more specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.

IV Habitat/Species Management Area: Protected Areas Managed Mainly for Conservation Through Management Intervention. Areas of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

V Protected Landscape/Seascape: Protected Areas Managed Mainly for Landscape/ Seascape Conservation and Recreation. Areas of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, cultural and/or ecological value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

VI Managed Resource Protected Area: Protected Areas Managed Mainly for the Sustainable Use of Natural Ecosystems. Areas containing predominantly unmodified natural systems managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

Source: IUCN 1994

The total combined area of the protected area system is more than 92,000 square km (Table 5). The regional distribution of these reserves is shown in Table 6, and the size characteristics are shown in Table 7.

Table 5: Area of Thailand's main protected area system components (April 2001)

Protected area classification	Number of Reserves	% of total national area	Area protected (sq km)
National Parks	102	10.15	52,263.52
Wildlife Sanctuaries	55	6.77	34,897.76
Non-hunting Areas	55	0.86	4409.59
Forest parks	67	0.17	870.49
Botanical Garden	15	0.01	58.96
Arboretum	54	0.01	36.08
TOTAL	348	17.96	92,536.40

Table 6: Regional distribution of protected areas in Thailand.

Region Area	National Parks	% Wildlife Sanctuaries	Non-Hunting
North	33	23	10
North-east	20	11	10
Central	14	8	17
South	35	13	18

Table 7: Size distribution of Thai National Parks, Wildlife Sanctuaries and Non-hunting Areas

Size (sq km)	Number of National Parks	Number of Wildlife Sanctuaries	Number of Non-Hunting Areas	% of System
More than 1,000	15	10	-	11.79
801-1,000	5	3	-	3.77
601-800	7	5	-	5.66
401-600	17	11	3	14.62
201-400	28	16	6	23.58
0-200	30	10	46	40.57
Total	102	55	55	100

Source: adapted from Gray et al. 1994; Thaiparks.com 2001.

Most protected areas are smaller than 1,000 square km and well over half of the system consists of areas smaller than 400 square km (Table 7). Many of these areas may not be big enough to provide the habitat area required to ensure species conservation, especially for larger vertebrates. Combining several national parks and wildlife sanctuaries into a single protected area complex significantly increases the potential area of connected habitat and its conservation potential. The size of

Thailand's 19 PA complexes now ranges from over 1,000 square km to more than 5,000 square km. This notwithstanding, increasing habitat size in most PA complexes requires the establishment of migration corridors between individual areas.

8.3 Forest Complexes

The 17 complexes of terrestrial protected areas have the following broad characteristics:

In the North:

1. Lum Num Pai - Salawin (western)
   This complex, comprising the Salawin, Kok and western Ping watersheds, is located in the more remote north and west. It includes a fairly loose assemblage of 16 PAs in a still-well-forested portion of the north. It includes large areas of dry evergreen and mixed deciduous forest, with smaller areas of upper and lower montane forests, dry dipterocarp forest and pine forests. It also includes the highest mountain, Doi Inthanon.

2. Sri Lanna - Khun Tan (central)
   This complex encompasses a range of mountains running north-south between the Ping and Wang rivers. It includes a string of reserves, namely Sri Lanna, Khun Chae, Jae Sawn and Khun Tan National Parks, Doi Pa Muang Wildlife Sanctuary and the proposed Mae Wa National Park. The complex protects dry evergreen forest, upper and lower montane forest, as well as mixed deciduous forest and dry dipterocarp forest.

3. Doi Phu Kha - Mae Yom (eastern)
   This region encompasses the Nan watershed, and is bisected by the deforested plains of the Nan river. It comprises a fairly scattered group of 16 reserves. The complex protects lower montane and upper montane forest, dry evergreen forest, as well as mixed deciduous forest and dry dipterocarp forest.

4. Mae Ping - Om Koi (lower western)
   Comprises a tightly knit group of six reserves. The complex protects lower montane and upper montane forest, dry evergreen forest, mixed deciduous forest, dry dipterocarp forest, pine forest and grasslands.

5. Phu Mieng - Phu Thong (lower eastern)
   This is a highly fragmented group of reserves, including Phu Hin Rongkhla and Thung Saleng Luang National Parks. The protected areas encompass lower montane and upper montane forest, dry evergreen forest, mixed deciduous forest, dry dipterocarp forest and pine forest.

In the North-East:

6. Phu Khieo - Nam Nao (western)
   The most important complex in northeast Thailand. Dominated by Phu Khieo Wildlife Sanctuary and Nam Nao National Park. Encompasses sizable tracts of lower montane, dry evergreen and mixed deciduous forest, but also smaller areas of upper montane forest and dry dipterocarp forest. Areas of pine forest are found.

7. Phu Pan (eastern)
   A scattered collection of reserves in the northeast of the region. The sites of Phu Pan, Huay Huot and Phu Tha Lik, together with Phu Si Tan Wildlife Sanctuary are important watersheds. These watersheds protect lower montane forest, dry dipterocarp, mixed deciduous forest and dry evergreen forest. It has areas of sandstone rock shelves.

8. Phatam-Phanom Dongrak (southern)
   This extended complex follows the Phatam-Khao Phanom Dongrak hills running along the border with Cambodia, and is bisected by the ancient ruins of Khao Phra Vihan. Seven reserves protect 1,655,595 *rai* (2,649 square km) of mixed deciduous and dry dipterocarp forest, together with dry evergreen forest on sloping sandstone hills. It has areas of sandstone rock shelves. Its integrity has been assisted by the presence of land mines within much of the interior.

9. Dong Phayayen - Khao Yai (southwestern)
   This complex includes the nation's first national park, Khao Yai, as well as Thap Lan, Pang Sida and Ta Phraya National Parks and Dong Yai Wildlife Sanctuary. These reserves cover 3,847,007 *rai* or 6,155 square km of mixed deciduous forest, lower montane forest, dry evergreen forest (including gallery forest) as well as dry dipterocarp forest.

In the East:

10. Eastern
    This complex protects important areas of southeastern monsoonal evergreen forest. Important areas include Khao Ang Ru Nai and Khao Soi Dao Wildlife Sanctuaries as well as Khao Chamao - Khao Wong and Khao Kitchakut National Parks. Other vegetation types present include dry evergreen, mixed deciduous and dry dipterocarp forest. Lower montane forest also occurs. These reserves support important populations of fauna and flora found in the region.

In the West:

11. Western or WEFCOM
    One of the most significant regions for wildlife conservation in Asia, WEFCOM includes 11 national parks and six wildlife sanctuaries covering 4,432,233 *rai* (18,730 square km) of almost continuous forest in six provinces of Thailand. The World Heritage Site of Huai Kha Khaeng and Thung Yai Wildlife Sanctuaries, designated in 1991, forms the core of the complex. The vegetation comprises mosaics of lower montane, mixed deciduous, dry dipterocarp and dry evergreen forest (including gallery forest), with significant areas of bamboo forest. The area has international conservation value, being one of the most significant refuges for many of mainland Southeast Asia's threatened large mammal species. Large mammals include Tiger, Asian Tapir, Asian Elephant, two bear species, Gaur, Banteng and the last population of wild Water Buffalo in the country.

12. Khang Krachan (lower western)
    This is an extraordinarily rich complex with Sundaic and Burmese affinities. The complex is dominated by the nation's largest national park, Kaeng Krachan, with Mae Nam Phachi Wildlife Sanctuary to the north and Kuiburi National Park to the south. These three sites encompass 2,733,320 *rai* (4,373 square km) of largely pristine habitat, protecting extensive tracts of lower montane, dry evergreen and mixed deciduous forest, with smaller areas of dry dipterocarp forest. This is an important complex for wildlife conservation.

In the South:

13. Chumporn (upper north)
    A loose string of six reserves, the area follows the Tenasserim range immediately south of the Isthmus of Kra, bordering Myanmar. It protects peninsular monsoonal evergreen forest.

14. Khlong Saeng - Khao Sok (lower north)
    This is a fairly extensive block of forest in the middle of the peninsula. The core reserves of Khao Sok and Si Phang-nga National Parks, together with Khlong Naka, Khlong Saeng and Khlong Yan Wildlife Sanctuaries and other satellite reserves, protect extensive tracts of peninsula monsoonal evergreen forest.

15. Khao Luang (central)
    A medium-sized complex comprising three national parks: Khao Luang, Tai Romyen and Namtok Si Kiet. These reserves protect 712,500 *rai* or 1,140 square km of peninsula monsoonal evergreen forest.

16. Khao Banthad (upper south)
    This complex is located on the southern extension of the mountainous chain running down the peninsula and encompasses peninsular monsoonal evergreen forest. The habitat is seriously threatened by conversion to rubber plantations.

17. Hala-Bala (extreme south)
    An extremely scattered group of protected areas, the most important conservation unit is Thale Ban National Park and Hala-Bala Wildlife Sanctuary, located on the border with Malaysia. This complex encompasses a representation of Malayan mixed dipterocarp forest, which supports unique fauna. The isolated site of Pa Phru protects the only significant area of peat-swamp forest in the country.

In addition to the 17 forest complexes, there are two marine protected area complexes (Map 2).

8.4 Marine and coastal protected areas

Thailand has an extensive coastline with an exquisite and productive marine environment in the Gulf of Thailand and Andaman Sea. There are 22 Marine National Parks covering 5,810 square km. Five additional sites are being proposed or surveyed. Four sites, namely Tarutao, Mu Ko Surin, Mu Ko Similan and Phang-nga marine national parks, have been proposed as World Heritage Sites. Mu Ko Phayam is intended for management as a Biosphere Reserve.

Marine protected areas are managed in conformance with the National Park Act of 1961, the National Forest Reserve Act of 1964, the Wildlife Conservation Act of 1992, and Fisheries Act (revised 1994). Most areas are established as national parks managed under supervision of the National Parks Office within DNWP. Marine protected areas share the planning and management procedures and challenges of their terrestrial cousins, with the added difficulty of overlapping and ambiguous jurisdictions between the authorities responsible for parks, fisheries and harbour and beach tourism development.

Apart from national parks there are several other types of protected areas under the jurisdiction of DNWP which cover marine and coastal areas. They include Ko Libong Non-hunting Area in Trang and Pranburi Forest Park in Prachaubkirikhan. These protected areas were established expressly to protect intact mangrove forests. About 16,000

square km are currently protected, but shoreline areas are under great development pressure and remain insufficiently represented in protected area system (Chettamart 1999).

Under the Fisheries Act, several coastal regions and the 3 km zone from the shoreline have been declared as fisheries spawning grounds, which are protected by relevant ministerial regulations and notifications administered by the Department of Fisheries of the Ministry of Agriculture and Cooperatives. These regulations aim to conserve marine fisheries resources, and include: (1) prohibition of the use of intoxicants, toxic substances, electricity or explosives for fishing; (2) determination of the sizes and kinds of fishing implements that are permitted in fisheries; (3) prohibition of capture of certain rare species such as marine turtles and dugong; (4) establishment of spawning and nursery seasons of particular commercially important species such as “pla tu” and prohibition of the use of certain types of fishing gear during these seasons; and (5) prohibition of the use of certain types of fishing gear in certain areas. The regulations authorise closure to fishing of vital refuges and breeding grounds at crucial times of the year.

Rehabilitation programs have been undertaken in some areas and artificial coral reefs have proven to be effective in regenerating fish stocks. Surveys of the artificial reefs found increased abundance in fish populations and species diversity (Ingthamjitr 2002).

Many coastal communities display great awareness of the management requirements of the marine and coastal resources on which their livelihood depends and the need for strong protection of their fishing grounds. Declining productivity along with decentralisation has led some communities to join forces and seek (and sometimes fight for) more concerted governmental support in maintaining the natural systems in near shore areas and in controlling damaging commercial fisheries .

The recently established Department of Marine and Coastal Resource (DMC) under MONRE brings under one umbrella the protection and survey of mangrove, beach and reef resources. Its mission is to conserve and revive marine and coastal resources through efficient and well-structured management, by promoting community participation, and setting in place an efficient inspection system. DMC responsibilities cover a wide range of marine issues including the control of red tides, protecting endangered marine species, ecosystem deterioration and restoration, monitoring coastal land exploitation and combating the illegal capture of ornamental marine fish.

Marine protected areas provide direct and indirect economic benefits by protecting diverse species and ecosystems. Mangrove forests, coral reefs, seagrass beds, soft sediment communities and beaches provide permanent or seasonal habitats for a wide range of plant and animal species. They provide environmental supports for fisheries productivity, while contributing subsistence benefit to local people. Marine and beach areas have become more accessible and popular for tourism and many important beach, island, coral reef and other marine habitats are the focus of tourism development requiring careful management.

8.5 Institutional arrangement for protected area management

No explicit policies or overall plans have been formulated for the PA system in Thailand. Instead, PAs are subject to a considerable number of cross-cutting policies and plans, with either a very general or a resource-specific aim. These include policies and plans formulated by the NESDB (which sets the overall development framework), MONRE (as implementing agency for PA management through DNWP, for general environmental policy through ONEP, forest production in areas surrounding PAs through the Royal Forest Department, and for conservation of marine and coastal resources through DMC) and MOAC (responsible for agriculture production and marketing) The policies and plans stress amongst other things the need for stakeholder participation, decentralisation, self-reliance, sustainable natural resource management and conservation.

8.5.1 Organisations and key stakeholders

In late 2002 during the public sector reform, the mandate for managing protected areas was changed from RFD to the Department of National Park, Wildlife and Plant Conservation (DNWP). Accordingly, the key direct institutional stakeholders for management of the PAs are:

- *DNWP under MONRE* with the key mandate and jurisdiction for management of the PAs. At the national level, DNWP is secretariat to a number of committees including the National Parks National Committee and the Wildlife Preservation and Conservation National Committee. These committees have been established by law to define policies related to protected area management.
- The *Local Government Authorities* located within or immediately around PAs. This includes the elected councils under the *Tambon* Administrative Organisations (TAO), which are mandated to undertake local environmental planning and management, as well as developing local infrastructure and spatial planning. Five percent of all national park revenue is transferred to the TAO via the Department of Local Administration (Ministry of Interior). This budget allocation is an example of direct PA benefits to local stakeholders.
- The *local communities* within and adjacent to PAs who to a varying degree are dependent on resource use inside the PAs and often have been there prior to the gazettement of the PAs. Within communities, the *Village Headman structure* (*Phu Yai Baan*) plays a significant role in village level decision-making, and links upwards to the Sub-district (Tambon) and District Authorities. Some community members are furthermore organised into Community Based Organisations (CBOs). CBOs have grown considerably in the past decade and today constitute relatively influential stakeholders in and around many protected areas. There is a significant difference in traditional leadership structures among various ethnic groups in the protected areas, but in many PA communities the traditional leadership plays an important role.
- *Private sector* stakeholders, who are currently or potentially engaged in resource use in or surrounding the PAs. They range from unregistered to fully legalised private tour operators in the National Parks and to commercial fishermen and swift nest collection around (and sometimes inside) marine National Parks.
- A variety of *non government organisations* are active in relation to the PA sector. They are regarded as direct stakeholders in their function as supporters of CBOs and range from local, provincial, national, and international NGO's and from conservation to development NGOs.

8.5.2 Department of National Park, Wildlife, and Plant Conservation (DNWP)

DNWP is the key department for PA management and consist of 13 divisions/offices at national level and 21 regional offices. The structure of DNWP is still new and is likely to undergo further changes and adjustments during 2003. Among the key offices for PA management are: the National Parks Bureau which is the office for policy and planning related to National Parks; the Wildlife Conservation Bureau, which is in charge of policy and planning related to Wildlife Sanctuaries and Watershed Management and Conservation Bureau, which is in charge of watershed area restoration policy and planning, and improving livelihoods of hill tribes who reside in watershed areas . The Training Division is in charge of training overall, but separate bureaus and divisions also carried out training activities. A central GIS capacity is found in the Protected Areas Management and Restoration Office, but a number of other bureaus and divisions have their own GIS capacity. The structure of DNWP reflects the types of PAs managed under the Department.

Within DNWP there are ongoing efforts to manage protected areas through an ecosystem approach, where PAs are understood in terms of their wider natural systems context and relationship with other PAs adjacent to or close to each other within forest complexes. The institutional structure for taking ecosystem approaches throughout forest complexes as a basis for managing specific PAs within them is still not clear and no permanent decision has so far been taken. The Secretariat charged with piloting ecosystem

management approaches in the Western Forest Complex (the WEFCOM Secretariat) falls at present under the Policy and Information Office, but was formerly under the Wildlife Conservation Office.

In line with decentralisation policy, the DNWP regional offices are now more directly involved with implementation, supervision and backstopping for individual protected areas. All DNWP functions are reflected at the regional level. At the individual PA level, PAs will typically be organised into a HQ and a number of sub-stations, depending on the budget and extent of the PA in question. The main officer in charge is the PA Superintendent, supported by one or more Deputy Superintendents, who in turn oversee the work of protected area rangers and various logistical staff. PA staff is made up of permanent staff (officers and rangers) and a larger contingent of temporary staff some of which have had positions for many years. In those cases, contracts are renewed annually with none of the government benefits received by permanent staff such as health insurance and education support for children .

At the PA site level, the ratio of staffing is typically 1-3 government officials, 5-20 rangers and 50-100 temporary staff, depending on the budget and extent of the PA in question. Due to the increasing number of PAs, actual numbers of allocated staff for each PA have tended to decrease in the individual PAs. Around 10% of DNWP staff hold BSc or MSc degrees, while another 10% hold forestry school certificates. Most Superintendents hold the latter as a minimum.

Wetlands lying within protected areas, mostly as non-hunting areas, are the responsibility of DNWP. But wetlands outside of the official protected area system, including rivers, ponds, and estuaries, are subject to a range of authorities. In some cases they are managed by the Department of Fisheries concerned with fisheries products, the Royal Irrigation Department responsible for developing water resources and water use, the Port Department concerned with stabilising river banks, and the Electricity Generating Authority of Thailand intent on power development. There is no single authority responsible for protecting wetland ecosystems outside protected areas. Many Thai communities are depended on fisheries from nearby wetlands, and there are several wetlands protected and managed by local communities, with or without NGO support. Management of wetlands on local initiative is especially prevalent in northeastern and southern Thailand.

8.5.3 Protected areas in wider institutional context

Before MONRE was established, the National Resources and Biodiversity Institute (NAREBI, established in 1998 under MOAC) provided MOAC with some flexibility in implementing its natural resource management policies. In Thailand, environmental management is largely segmented according to the type of resource system and the associated objectives or specific assignment of responsibilities by law. It has long been recognised that this strict separation of jurisdiction and responsibility over various portions of a protected landscape leads to a lack of unity in the direction, formulation of policies, and design and implementation of projects needed to mount an integrated response to conservation challenges. NAREBI was established to help facilitate a new concept of ecosystem management, pursuit of which would reduce the institutional overlap and duplication of efforts among various agencies. In October 2002, NAREBI was dissolved and its roles fully taken over by MONRE.

MONRE was established in 2002 to integrate all natural resources conservation and management responsibilities within the one ministry. The former OEPP, under MOSTE has been renamed as the Office of Natural Resources and Environment Policy and Planning (ONEP) and functions under MONRE. It still carries on its former roles which are to develop environmental policies and plans in accordance with the Enhancement and Conservation of National Environmental Quality Act of 1992, and serves as the coordination center for natural resource management to promote national sustainable development. ONEP is also the National Biodiversity Reference Unit (NBRU) of Thailand and links with the ASEAN

Regional Centre for Biodiversity Conservation (ARCBC), and with national authorities and institutions involved in biodiversity conservation in other South-east Asian countries. The establishment of an independent organisation at national level as coordinator of biodiversity and CBD related matters is under consideration.

There are several other government organisations with responsibilities relating to protected areas and biodiversity conservation. These include the Department of Fisheries (MOAC), which is responsible for ensuring the sustainability of Thailand's freshwater and sea-based fisheries resources and the Community Development Department (Ministry of Interior,) which has increasingly been active at the local level, working on sustainable development planning and implementation in buffer zones adjacent to protected areas.

There are, in addition, many national and international non-governmental and community organisations with a long involvement in environmental policy promotion as well as support for local community-based conservation and sustainable resource management in all regions of Thailand. In October 2001, the Community Organisation Development Institute (CODI) was established to promote the development of community organisations and civil society by coordinating the efforts of stakeholders involved in community development.

8.5.4 International protection area designations without legal status

Thailand became a signatory to the International Convention on Wetlands of International Importance or RAMSAR in 1998. There are ten Ramsar sites in Thailand with a total area of 3,731.80 km^2. Much focus is currently on existing protected area categories which include wetlands, in particular non-hunting areas, marine protected areas and national reserved forest. These areas include, for example, the Ramsar site of Kuan Si Sian within the Thale Noi Non-hunting area in Songkhla, Phattalung, Nakornsrithammarat Province of Southern Thailand, Bung Khong Long of the Bung Khong Long Non-Hunting Area in Nong Khai Province, Don Hoi Lord in Samut Songkhram Province, Krabi Estuary in Krabi Province, Nong Bong Kai Non-Hunting Area in Chiang Rai Province, Princess Sirindhorn Wildlife Sanctuary (Pru To Daeng Wildlife Sanctuary) in Narathiwat Province, Hat Chao Mai Marine National Park, Koh Libong Non-hunting Area, and Trang River Estuary in Trang Province, Laemson National Park- Kapoe Estuary- Kraburi River Estuary in Ranong Province, Mu Koh Ang Thong Marine National Park in Surat Thani Province, and Phang Nga Marine National Park in Phang Nga Province. The size of these sites varies from the 108,420 ha Laemson - Kapoe – Kra buri site to the 434 ha Nong Bong Khai site. ONEP is the lead agency promoting Ramsar sites and the Convention. It cooperates closely with managing agencies in the wetland locations, including DNWP, DoF, local and national NGOs, and relevant provincial authorities.

Thailand has four UNESCO-MAB Biosphere Reserves: Sakaerat in Nakhon Ratchasima Province under the Thailand Institute for Scientific and Technical Research (TISTR), Kog Mah- Mae Sa in Chiang Mai Province and Huay Tak in Lampang Province under DNWP, and Ranong Biosphere Reserve in Ranong Province now under DMC. The concept of biosphere reserves has also been promoted for community-based conservation of Koh Pra Thong Conservation Island, in Ranong Province

There is only one natural world heritage site, comprising of two wildlife sanctuaries, Thung –Yai and Hauy Kha–Khaeng in the middle of the Western Forest Complex. The benefits of world heritage listing have been more in the form of higher public awareness and participation in conservation of the site rather than in terms of management innovation or increased funding. DNWP has carried out its work there in the same way as for other wildlife sanctuaries.

Integrated and multi-sectoral management of these various international sites was expected to increase. This has not been the case. Even so, there is a good deal to learn from these sites in terms of constraints and opportunities for effective management to help shape approaches throughout the national PA system.

8.6 Protected area site management plans

Drawing on in-house expertise, usually in collaboration with experts from universities and private consulting firms, the DNWP produces five-year management plans for all gazetted national parks and wildlife sanctuaries. By 1999, more than 30 national parks and about 20 wildlife sanctuaries had management plans that had been formally approved by the Director-General. During the year or so preparing each plan, a steering subcommittee works with the planning team to ensure that the terms of reference are being followed. Increasingly, the Department has endeavoured to ensure that various stakeholders are consulted during the PA management planning process. Stakeholders may include, for example, key NGOs, private-sector owners and operators of local tourism facilities, and local populations living in proximity to protected areas.

Frequently, PA demarcation is carried out by walking the proposed boundary lines with representatives of local communities. This is a relatively recent innovation that stems from the government's decentralisation policies. Yet, often consultation has been cursory and ad hoc.

Once completed, a committee comprising representatives from DNWP, the Tourism Authority of Thailand, universities and NGOs vet management plans. Approved plans then go to the MONRE Permanent Secretary for final signature. Once signed, they are passed to PA superintendents for implementation.

Internal monitoring however indicates that PA management plans are not effectively implemented. The reasons for this poor level of performance include plan prescriptions being too elaborate or demanding, lack of staff, inadequate equipment and insufficient budgets. Many DNWP officials acknowledge that PA management plans tend to be too academic, with limited value when allocating the annual budget and establishing guidelines for field-level implementation. They do not provide sufficient measures for mitigating the main pressures and challenges to effective protected area management (Clarke n.d.).

8.7 Budget allocations for protected area planning and management

Budget allocations to support DNWP functions are made within MONRE. The budget cycle usually involves 2 years advanced planning. DNWP submits a budget plan to the Cabinet through the Budget Bureau. With agreement from the Cabinet, the plan is submitted to the Parliament. Once passed, the Budget Bureau will inform all ministries of its allocation. As protected areas are located throughout the country, DNWP's Finance Division then transfers funds to its 21 Regional Offices.

Prior to the reform of government in October 2002, the budget for protected areas was allocated to RFD. Table 8 shows allocations of expenditure by RFD to different programs from 1996 to 2000. Total expenditure by RFD declined during the period, with most of the decrease relating to forest conservation activities. The tourism development program was formulated in 1999, and its budget focused on national parks. Approximately half of all budget allocations went to wages and salaries, one quarter to structures, land and building materials, and one quarter to other items.

Table 8: Program Expenditures by the Royal Forest Department (million baht)

Budget Item	1996	1997	1998	1999	2000
General Administration	1,549	1,427	1,199	1,160	1,146
Forest Conservation	7,287	4,066	3,426	3,473	3,528
Forest Development Program	0	4,200	3,556	3,248	3,282
Forest Research	310	332	271	275	393
Tourism Development Program (in the form of a loan)	0.279	0	0	60	66
Total	9,148	10,026	8,454	8,219	8,416

Table 9 shows allocations to forest conservation in 2000 within RFD's budget, within the Ministry overall, by all relevant agencies and within the national budget. Forest conservation accounted for about half of the RFD budget, 22 per cent of the Ministry budget and 0.4 per cent of the total national budget.

Table 9: Budget allocations for forest conservation in the Year 2000

Budget Item	Million baht	Forest conservation expenditure (% budget)
Forest Conservation in Royal Forest Department	3,528	-
Total Royal Forest Department Budget	8,416	41.9
Budget for Ministry of Agriculture and Cooperatives	16,045	22.0
Total Budget – All Agencies	93,547	3.8
National Budget	910,000	0.4

Since October 2002, budget management has been a key field of reform. The former budgetary system focused on monitoring income and expenditure and related procedures. The new system is based on performance and focuses on substantive outputs and outcomes. Budget allocations will be in the form of block grants to the Department rather than according to activity. By the end of 2003 the changes had not been fully implemented at all level, for example, in divisions and at protected area sites. Once fully functioning, the DG of DNWP will sign an MOU guaranteeing all outputs and outcomes will be achieved against a set of indicators. Within the Department, each office and protected area superintendent will also sign an MOU guaranteeing the delivery of the outputs and outcomes for which they have responsibility. There will be linked evaluation and incentive mechanisms to promote good performance.

In addition to the annual budget allocation, national parks are the only type of protected area that has additional funds for the management and collection of revenue generated from entrance and accommodation fees, and fines. There are a number of national parks, particularly those popular with domestic tourists that do not yet collect entrance fees. Part of the revenue generated from these sources is channelled into a central fund within the Department and managed by the National Park Revenue Committee of DNWP.

Annual income from each national park is divided four ways. The first 5 per cent of total revenue is transferred to the Sub-district (Tambon) Administration Organisation (TAO) through the Department of Local Administration, Ministry of Interior. Ten per cent of the remaining revenue returns to the park for improving its visitor services, for example, through the hiring of temporary staff as guest house cleaners or nature guides. A further 50 per cent of funds remaining also returns to the park for protection activities and staff capacity building. Forty per cent from all parks goes to the National Park Revenue Fund, and is distributed to each park accordingly to project proposals submitted to and approved by the Department's Revenue Committee. The fund provides extra budgetary support for a park to cover its ad hoc activities and initiatives.

8.8 Key Issues

8.8.1 Effectiveness of protection activities

The size of Thailand's protected area system has grown rapidly over the past 15 years. Even prior to the significant area increases, RFD found it difficult to monitor and control illegal activities occurring within and surrounding PA boundaries. That challenge has now increased. There is an urgent need for management strategies which provide adequate staff incentives, training programs, and communication equipment to increase the effectiveness, frequency and coverage of patrolling. Three closely related strategies would also prove effective by limiting the area in which regular patrolling would need to be carried out. First, rural communities resident in buffer zone areas surrounding (or sometimes within) National Parks and Wildlife Sanctuaries could be enlisted to participate in efforts to protect critical conservation sites. Second, incentives for their active participation in conservation efforts could be provided by designating peripheral areas within current park boundaries where non-timber forest products could be collected by the communities on a sustainable basis. Finally, mechanisms are needed for communities and conservationist groups to participate in the assessment and screening of any investment projects proposed for development within protected areas and their buffer zones.

8.8.2 Management plans for protected areas

Current protected area management plans are often unrealistic in the context of on-the-ground conditions and constraints. It is important that existing plans be simplified to focus on what is feasible and a priority for action. Plans need to be better matched to staffing availability, budgets, and local communities mobilised in meeting management objectives. Incorporating local concerns into management plans would help to achieve local compliance and enlist local community contributions. Each protected area requires an advisory committee representing key stakeholders to help shape and steer implementation of management plans.

8.8.3 Current regulations and multiple use

Current PA regulations do not provide for multiple use. National Forest Reserve, Biosphere Reserves and Ramsar sites recognise the legitimacy of such uses when they are consistent with the overall objective of conserving important ecological services and biodiversity. The DNWP is exploring the development of PAs for tourism and the negotiation of joint management agreements with local communities using PAs. Appropriate alterations to existing regulations would enable certain non-destructive uses to be legitimised, potentially enhancing PA management and benefits. Various stakeholders may have an interest in deriving and sustaining such benefits, although trade-offs may be necessary to balance the delivery of benefits among various sectors. An open planning process is needed that involves zoning, boundary demarcation and determining regimes of use and protection for specific sites.

8.9 Achievements

8.9.1 Ecosystem and multiple use approaches to protected area management

Several models for the management of protected areas are evolving in Thailand. These include the creation of forest, marine and coastal zone complexes, the testing of ecosystem planning approaches covering entire complexes, multiple-use Ramsar and Biosphere Reserve sites, and various projects exploring collaborative management regimes.

8.9.2 Expansion of the protected areas system

As a result of the logging ban and proactive government policies, the protected area system expanded rapidly from 1989 until the present so that now there are 348 areas covering close to 18 per cent of the nation, and a number of proposed protected areas still to be declared to meet the goal of 25 per cent coverage. However, as the definition of a protected area has been limited to governmental declaration and management, some have viewed the policy of expansion of the system to cover 25% of the country as against the interests of local people. Future protected area expansion will be difficult to achieve.

In additional to the conventional protected areas, there are almost 10,000 forest patches which have been declared under the National Forest Reserve Act 1964 as community forest, managed and conserved by communities for their use. Under the Act, the Director General of RFD is authorised to declare a community forest, but first the concerned community must prepare a management plan, identify its regulations, and define the exact boundaries of the utilisation zones. This must be done by communities with the support of the TAO, District Sheriff and Provincial Governor before submission to RFD for declaration.

8.9.3 Protected area management plans

Management plans have been prepared for about 100 protected areas. The first management plan was prepared for Khao Yai National Park in 1981. Since then, there have been many approaches to find the best way to draft a plan. It has evolved from a team comprised of internal RFD experts, to various forms of contractual arrangement with academia (e.g. Kasetsart University and Mahidol University), or government technical organisations (e.g. the Ecological Research Division of the Thailand Institute for Science, Technology and Research). Now, DNWP contracts consulting firms to draft the plans, which are then reviewed by the steering committee which comprises of both internal staff and representatives from academia and NGOs. Once finalised, the plan is submitted to the Director General for approval.

In the last five years, national park management plans have introduced micro-level zoning schemes incorporating restricted, buffer and transitional zones.

8.9.4 Local community involvement in protected area management

Historically, local community participation in protected areas has been inhibited by the emphasis in the *National Parks Act* (1961) and the *Wild Animals Reservation and Protection Act* (1960), which emphasised strict protection of nationally significant PAs. In August 2001, the Community Participation in National Park Management - Pilot Project was initiated by the Ministry of Agriculture and Co-operatives and RFD as a direct result of the new Constitution (1997) and the growing support for community participation in forest management. This significant ongoing project is being undertaken in six areas: Thaleban Marine National Park and Laem Son, Chaloem Rattanakosin, Phu Pha Maan, Obluang and Doi Phu Kha national parks. PA committees have been established in each protected area to facilitate community involvement.

The role of community involvement in PA management was strengthened by the new Constitution; specific articles refer to the involvement of communities in natural resource management (Box 3).

8.9.5 Increasing understanding of conservation and development links

Conservation and development are no longer considered mutually exclusive objectives. There is now a much better understanding that conservation serves development, that environmental considerations need to be brought into development project design, and that conservation threats can be defused if communities resident in and around protected areas have a share in PA benefits.

During the past decade all means of mass media - television, radio, and newspapers – have increased coverage of nature conservation and related development issues. Many companies also link their products to conservation and the value of natural resources. The Petroleum Authority of Thailand, for example, actively advertises its mangrove reforestation program as a key element in its promotional campaigns. Tourism magazines and nature handbooks published in Thai have increased dramatically and have a ready market.

Box 3: The Thai Constitution - Articles on local participation in natural resource management

Section 46. Persons so assembling as to be a traditional community shall have the right to conserve or restore their custom, local knowledge, arts or good culture of their community and of the nation and participate in the management, maintenance, preservation and exploitation of natural resources and the environment in a balanced fashion and persistently as provided by law.

Section 56. The right of a person to give to the State and communities participation in the preservation and exploitation of natural resources and biological diversity and in the protection, promotion and preservation of the quality of the environment for usual and consistent survival in the environment which is not hazardous to his or her health and sanitary condition, welfare or quality of life, shall be protected, as provided by law.

Section 79. The State shall promote and encourage public participation in the preservation, maintenance and balanced exploitation of natural resources and biological diversity and in the promotion, maintenance and protection of the quality of the environment in accordance with the persistent development principle as well as the control and elimination of pollution affecting public health, sanitary conditions, welfare and quality of life.

8.9.6 Movement toward inter-agency approaches to protection

Along with growing understanding of the inherent linkages between conservation and development, a much broader range of agencies has become actively involved in providing support for conservation. For example, the Department of Local Administration (DOLA) has a section that deals specifically with environmental issues in its Local Government Development Affairs Division (LGDAD), with environmental officers working in local government throughout the country. The Health Department, Royal Forestry Department, Department of Fisheries, Department of Agriculture and Ministry of Education also have functions relating to or specifically dealing with environment and natural resource conservation issues. The environmental education programs of several NGOs and local groups have been recognised and integrated into programs of the Ministry of Education. Good examples are the “River Spy” program conducted throughout the country by The Green World Foundation supported by DANCED and nature education at Hauy Mai Dee by WWF - Thailand.

8.10 Challenges

8.10.1 Updating protected area legislation and policies to conform to constitutional guarantees of public and community roles in natural resource management

Thailand's Constitution guarantees a role for the nation's civil society in managing and benefiting from the sustainable use of local natural resources. Existing laws and policies associated with the administration and management of natural resources have yet to be significantly altered to reflect this, however. Nonetheless, the situation is changing rapidly and moving toward accommodating the right and interest of communities to participate, through, for example, decentralisation and the Tambon Administrative Organisation (TAO) system. These processes are proceeding slowly and there are potential pitfalls as the ability of TAOs to represent local populations comes under close scrutiny. New capacities, methods and resources are required.

8.10.2 Insufficient input from protected area expertise

Various agencies have skills and resources to offer in managing PAs more effectively. Agencies such as the Department of Fisheries, the Office of Natural Resources and Environmental Policy and Planning, the Tourism Authority of Thailand, Maritime Transportation and Commerce Department, Community Development Department, Department of Health, Department of Land and Land Development Department all have various responsibilities and capacities associated with the management and administration of natural resources and communities. Better coordination and inter-agency working links need to be applied to PAs from cental to sub-district level.

A number of challenges are particularly important:

8.10.3 Need for national protected areas system plan

An additional problem is that the PA management models currently recognised by Thai policy and law are focussed primarily on enforcement and preservation. As a result, it has not been possible to adopt the more flexible PA management categories used in other countries, which permit human settlement, the sustainable use of natural resources, and traditional agricultural practices. This has exacerbated land-use conflicts and heightened tensions with local communities. A further concern is that there are relatively few mechanisms available to promote institutional coordination or the involvement of civil society in the design, establishment and management of protected areas.

Development of a national protected area system plan for Thailand is needed to diversify category of protected area. This system plan needs to be developed through a participatory process involving an array of stakeholder groups, including government sectoral agencies, NGOs, universities, the private sector and community organisations. The plan will seek to ensure that all of Thailand's major ecosystem types are adequately represented in the protected area system, and provide recommendations on the desirability and feasibility of adopting a broader and more flexible range of PA management categories. The plan will also present recommendations on developing an integrated policy and legal framework for protected areas, enhancing institutional coordination, and expanding partnerships between government agencies and civil society.

8.10.4 The need for an effective national level protected area committee

A national level protected area committee is needed to bring together the two current national committees for national parks and for wildlife conservation and preservation. In fact all the existing national level committees concerning on natural resources, including environment, biodiversity, forest, and wetlands need to be reviewed, strengthened and integrated.

Functions of the Protected Area National Committee could be based on those of the existing committees, especially the National Park Committee and Wildlife Preservation and Conservation National Committee. Functions should include: (i) Provide a forum for consultation and discussion of all policies and issues relating to the management of the national protected area system; (ii) Consider and make proposals for the addition of lands to PAs and the establishment of new protected areas; (iii) Review the revocation, reclassification and boundary alterations of PAs when called upon and make recommendations as appropriate; (iv) Prepare and approve policies and management guidelines for each protected area category; (v) Provide guidance on the approach to enclave villages in protected areas; (vi) Approve PA management plans and changes to and reviews of management plans; (vii) Advise on the priorities for PA expenditure; (viii) Review and report to the MONRE Minister on the effectiveness of the administration of policies for protected areas; (ix) Exercise such powers and functions relating to protected areas or complexes of protected areas as may be required by the Minister from time to time; and (x) Give advice to the MONRE Minister or the Permanent Secretary on any other matter relating to any protected area.

Existing national committees include representatives from diverse groups in the government and non-government sectors but representation needs to be consistent and members should required to report effectively to their constituency. Further, the committee secretariat needs to be strengthened with capacity to follow up efficiently on committee decisions.

8.10.5 The need for effective PA management committees

Site level management committees need to be established at all the protected areas including representatives from key sectors such as the local office of the Tourism Authority of Thailand, provincial and district authorities concerned with natural resources management, agricultural officers and persons from the village communities within the protected areas (i.e. from enclave villages and the community development zones) on the recommendation of the senior village representatives. Core members and secretariat would be the protected area Superintendent and 2 key protected area staff.

The functions of the PA management committees would include: (i) providing a forum for consultation and discussion of policies and issues relating to the management of the PA among stakeholders. The Committee could forward special recommendations regarding the PA policy to the National Protected Areas Committee. In addition the Committee would review and approve (ii) the zoning scheme drafted through the collaborative planning process as part of the PA management plan; (iii) any joint management agreements reached with stakeholders; (iv) local PA management guidelines and regulations; (vi) the fire management strategy (if applicable) drafted by the Fire Protection Association(s) and protected area authorities; (vii) the registrar of existing tourism and proposed tourism concessions; and (viii) the overall contents of the draft PA management plan.

8.10.6 Legally endorsed PA management plans

A PA management plan should provide the operational framework for all activities within the area. It needs to be prepared by the local PA staff and stakeholders with the necessary technical support so that the plan can be implemented with the limited resources and capacities of those involved.

The plan should provide:

1. a statement of PA management objectives and the main reasons for its establishment;
2. a summary of past management, including staffing levels, facilities, finances, conservation and development activities;
3. a description of the main physical and biological features, with particular attention to any rare or endangered habitats or species;

4. an updated inventory of communities and their populations residing within, and in immediate proximity to, the protected area;
5. an assessment of current human activities within and surrounding the protected area and issues relating to its management;
6. a zoning plan, whether proposed or implemented, and a summary of land allocation in villages within and around the protected area;
7. a set of regulations for managing each zone as agreed with local stakeholders; and,
8. proposals for community development and protection initiatives within the protected area and its community development zone, particularly as these relate to the local community welfare, education and building long-term support for the PA.

The PA management committee should keep the management plan under regular review, so that it is altered in accordance with increased knowledge or changing circumstances. The management plan should be reviewed at intervals of not more than five years.

Once the management plan is drafted to the satisfaction of the PA committee it should be referred to the National Protected Areas Committee for comment. Before approving the plan, the PA Committee should ensure that the National Committee's views have been taken into account. Every approved management plan should be the key document referred to in drafting the annual PA budget. It should be made available for public inspection at the office of the protected area Superintendent and at the DNWP in both regional offices and the central office in Bangkok.

8.10.7 The need to improve multiple-use zoning arrangements

Protected areas often cover vast areas and encompass mosaics of habitats. Their intrinsic values vary greatly. The distinguishing features of multiple use

zones relate to their conservation and biodiversity values, their degree of disturbance and accessibility; and their compatibility with certain development actions. Recognition of these spatially differing values by the protected area authorities is reflected in zoning schemes (Box 4).

Integrated conservation and development requires determining the primary management objectives of each zone, the intensity of protection and the level of sustainable use if appropriate. While Thailand has regulations for various types of development zones, these will need to be more rigorously applied. Each PA will require a zoning plan, with permitted uses and resource off-take limits based on technical information and local community knowledge and practices. The current ambiguity in and, in some cases, contradictory nature of some zoning regulations, particularly in marine and coastal management, is another important administrative and zoning matter which needs to be addressed.

8.10.8 Inclusion of enclave communities within protected area boundaries

As Thailand's protected area system expands towards 25 per cent national coverage, the status of local communities resident in, or having land and resources within PA boundaries will continue to be a challenge and will need to be resolved in an equitable and collaborative manner. Protected area boundaries are frequently unmarked and poorly known to local communities. These situations need to be rectified by applying participatory demarcation approaches developed by RFD over the past decade. PA management authorities should have the ability to provide incentives and disincentives for protection and use., These could include arrangements for controlled extraction of non-timber forest products from specified zones in exchange for community conservation patrolling.

Box 4: PA zoning schemes

A zoning scheme provides for a range of levels of protection and use. A general zoning scheme, based on ecosystem and socio-economic surveys, has been developed for the Western Forest Complex of 17 PAs. The information below illustrates the kind of management objectives that can be addressed through zoning. The precise number and types of zones will vary according to the characteristics of the PA and should be determined by PA management committee:

Strict Protection Zone: Areas with high biodiversity which should be closed to all human activity except scientific studies and /or ceremonial or religious use by local communities.

Sustainable Use Zone: Natural areas where the habitat and its associated biodiversity must be conserved but where local communities, tenured migrants and residents may be allowed to collect and use natural resources through traditional sustainable methods that do not conflict with biodiversity conservation requirements.

Research, including the reintroduction of indigenous species, may be undertaken and park visitors may be allowed limited use. No clearing, farming, settlement, commercial use or other activities detrimental to biodiversity conservation should be undertaken. The level of allowable activities will vary from one site to another.

Restoration Zone: Areas of degraded habitat where the long-term goal is to restore natural habitat with its associated biodiversity and to rezone the area for stricter protection and restricted uses. Natural regeneration can be assisted through fire control and the planting of native species by local communities. Existing houses and agricultural developments may initially be allowed to remain but should be phased out.

Habitat Management Zones: Area with significant habitat and species values where management initiatives are required periodically to maintain specific non-climax habitat types or conditions required by rare, threatened or endangered species. Human habitation and sustainable use may be allowed if they contribute to habitat management.

Multiple-Use Zones: Areas where settlement and traditional and sustainable land-use, including agriculture, agroforestry, extraction activities and other income-generating or livelihood activities, may be allowed if they are consistent with basic conservation and sustainable use objectives. Land tenure may be granted to residents, whether they are indigenous cultural community members or migrants.

Cultural Zones: Areas with significant cultural, religious, spiritual or anthropological values where traditional rights exist and ceremonies and/or cultural practices take place.

Recreational Zones: Areas of high recreation, tourism, education or environmental awareness values where sustainable ecotourism, recreational, conservation education or public awareness activities may be allowed as prescribed in the management plan.

Special Use Zones: Areas containing existing installations of national significance, such as telecommunication facilities, major roads, temples and electric power lines. Such installations may be retained subject to mutual agreements among the concerned parties, provided such installations will not violate any prohibitions relating to the protected area.

Community Development Zones

For each protected area, community development zones should be formally established to compensate communities for reduced access to traditional natural resources, where biodiversity values are outstanding. The community development zones will also protect the reserve from activities that will directly and indirectly harm it. These community development zones should be included in the management plan that will be prepared for each protected area. A primary objective in the designated community development zones would be to promote sustainable economic and social development of the area's communities.

8.11 Future directions

In summary, the required changes to PA planning and management throughout the national PA system include the following:

- Policies and approaches for integrated multiple use and conservation that capitalise on potential PA development benefits while ensuring resource use sustainability and effective protection of critical conservation core zones.
- Establishment and refinement of core areas to enable greater concentration on preserving critical biodiversity hotspots. This will require an enhancement of current enforcement mechanisms.
- Training for protected area management staff on facilitating collaborative management; development and improvement of formal processes for multi-stakeholder consultation and sharing of protected area and environmental management responsibilities and benefits.
- Clearly demarcate protected area boundaries with stakeholder participation.
- Establish collaborative PA management structures such as PA management committees and define procedures for reaching joint management agreements with local communities. Approaches to joint management will need to be tested and demonstrated.
- Provide economic incentives to mobilise local communities in integrated development and conservation efforts. Ensure that communities are sufficiently compensated for their contributions to conserving critical conservation areas.
- Explore the potential for creating natural corridors between protected areas in forest and marine protected area complexes.
- Improve the environmental impact assessment process, legislation and the enforcement of laws as they apply to activities that have the potential to affect protected areas.
- Ensure that all PAs have management plans that are simple, practical and able to be implemented within the capacities of the PA authorities and stakeholders involved.
- Develop and provide training in participatory monitoring and control approaches and adapt PA management plans according to lessons learned from implementation experience.

Protected areas systems plan

The growth of the PA system over the last decade has not occurred in a systematic or strategic way that reflects its many uses and objectives. The current protected area categories were originally drafted in 1960 and 1961 and need to be reviewed. The National and Social Economic Development Board, the Office of Environmental Policy and Planning, the DNWP and other natural resource agencies should give high priority to preparing a Protected Areas National Systems Plan.

Part 4: Sector development and protected areas

Introduction

Protected area conservation in Thailand continues to be perceived mostly as a method to ensure conservation of the kingdom's rich, albeit diminished, biological heritage. Yet, a growing number of specialists from a range of disciplinary backgrounds have begun to emphasise the direct link between the country's national protected areas system and Thailand's economic productivity through the supply and maintenance of key environmental goods and services. The Total Economic Value (TEV) approach to natural resource valuation, which has been demonstrated in the field studies component of the PAD review, allows sector planners and protected area managers to take account of the full development benefits of protected areas within their policies and budgets. The TEV approach encompasses direct commercial values, non-market values, ecological functions, and non-use benefits associated with protected areas. It is the sum of the tangible and intangible cost and benefits from a protected area. It needs to be applied in defining the development relationships and flow of costs and benefits between all natural resource based sectors and protected areas.

9 Forestry and protected areas

9.1 Current relationship

All forms of protected forests make important contributions to local and national economies – most remain unaccounted for in development budgets. When properly managed, natural forests can deliver sustainable supplies of timber and a range of other non-timber forest products and services. NTFPs provide important sources of alternative livelihood products for rural communities, either as a direct contribution to their subsistence (e.g. wild food, construction material and medicinal products), or through supplemental income generation from the sale of raw materials and manufacture of handicraft products.

Maintaining forest ecosystems in their natural state supports a range of ecological services. Forests are important climate and hydrological regulators, contributing to the mitigation of drought and floods, and to the delivery of a steady supply of high-quality water resources through aquifer recharge and discharge. Forests are also important bio-regulators. They help to maintain a balance of pests and predator organisms, which minimizes the potential of pest outbreaks in agricultural crops. Maintaining the pest-predator balance reduces the dependence on agricultural chemicals that can be costly and harmful to human health. Protected forest habitats are also one of the primary mechanisms for the maintenance of terrestrial biological diversity.

9.2 Issues

9.2.1 Recent history of forest depletion

Until relatively recently, Thailand was very richly endowed with forests. The kingdom's forests contain a wide variety of tropical and subtropical hardwood species, many with high commercial value. Since the turn of the twentieth century commercial forestry has contributed significantly to the country's national revenues. Until 1953, Thailand was able to maintain its

forested area at 60 per cent of total land area due to non-destructive selective logging, which used elephants for extraction, and because of the availability of extensive lowland farming areas and a relatively low population of 23 million. Between 1954 and 1967, large-scale government allocation of forests for commercial exploitation was carried out with the expectation that forest revenues would support national economic development. By 1968, 500 private timber concessions covered half the country.

Illegal logging has long been a problem in Thailand. It became increasingly serious as extraction technologies grew more sophisticated and Thailand's road network improved. In 1973, RFD reported 7,600 incidents of illegal felling of teak alone. Logging, both legal and illegal, caused rapid deforestation during the 1960s and 70s.

The widespread conversion of forest lands to agriculture is often a permanent transformation in land use. As ethnic minority populations in the northern part of the country grew, their numbers swelled by in-migration from bordering countries, shifting cultivation took a further toll on the nation's forests (TDRI, 1987). Meanwhile, ethnic Thais were migrating to the north where they practised shifting cultivation at inter-montane valley margins. An increasing population, growing land scarcity and government policy to increase agricultural exports all accelerated the pace at which deforested areas were converted to agriculture.

By 1967, forest cover had been reduced to 48 per cent, and by 1980, only 32 per cent of forest cover remained. Although in 1989 a strict ban on logging was imposed, ten years later Thailand's forested area had declined further, to 25 per cent by official estimates, and to 22 per cent according to FAO (FAO 1999 and 2001). Deforestation has continued to the present time; current estimates of forest cover range from 18 to 33 per cent of national land area.

The results of forest assessment, using visual interpretation of 1:250,000 Landsat images are shown in Table 10. Between 1973 and 1998, the total area of deforestation was about 92,003 square km, with the annual deforestation rate about 3,680 square km. Deforestation peaked in the mid-1970s, when the annual loss was about 11,596 square km.

Table 10: Assessment of forest areas in Thailand between 1973 and 1998.

Year	Forest Area (square km)	Percentage cover	Deforestation Area (square km)	Period (No. Years)	Annual Deforestation Rate (square km)
1973	221,725.00	43.33			
1976	198,417.00	38.67	23,308.00	3	7,769.33
1978	175,224.00	34.15	23,193.00	2	11,596.50
1982	156,600.00	30.52	18,624.00	4	4,656.00
1985	150,866.16	29.40	5,733.84	3	1,911.28
1988	143,803.49	28.03	7,062.67	3	2,354.22
1989	143,417.00	27.95	386.49	1	386.49
1991	136,698.05	26.64	6,718.95	2	3,359.47
1993	133,553.55	26.03	3,144.51	2	1,572.25
1995	131,485.06	25.62	2,068.49	2	1,034.24
1998	129,722.28	25.28	1,762.77	3	587.59

Source: Charuppat 1998.

In 2000, the Forest Resources Assessment Division of RFD conducted a forest land-use assessment by using visual interpretation of LANDSAT-TM images at the scale of 1:50,000. The different forest types and other main land uses were classified, providing more detailed information than simply forest and non-forest classes. In addition, forest land-use data was entered into GIS databases. Based on the preliminary forest land-use data, it was found that the forest area of Thailand in 2000 was about 172,050 square km or about 33.40 per cent of the total land area of the country.

The factors that contribute to deforestation are fairly extensive and complex, including population growth and expanding agricultural production for export. A study of deforestation in several Northeastern provinces cited population density, price of wood, poverty, road density, rice yield and distance from the market as central factors contributing to deforestation (Panayotou and Sungsawan 1989). A similar study in the same region cited poverty (in terms of real GDP per capita), population growth, and the price of cassava as the main causes (Tongpan et al. 1990). Yet another study showed that the demand for agricultural land helped explain the conversion of forest to agriculture. Conversion is positively related to the price of main crops and farm population numbers, and negatively related to agricultural productivity and degree of industrialisation (Panayotou and Parasuk 1990).

The two main underlying causes of deforestation in Thailand have been the increasing demand for land for agriculture to meet the needs of the growing population and commercial logging. The demand for land depends on land prices, agricultural productivity, prices of agricultural products, alternative sources of off-farm employment and income and population growth (TFSMP 1993). The intensity of logging, whether legal or illegal, is influenced by wood demand and prices, forest accessibility, and population growth (Box 5).

Box 5: Factors effecting deforestation

Land prices. There are no proper market or market prices for forest land since it belongs to the state, but nevertheless land speculation is common close to growth centres. The implicit price of forest land is determined by the cost of clearing and transport, which the farmer would incur as long as the marginal cost is lower than the marginal benefits obtained from both the forest and the farm produce. Tourism has increased the price of forest and other land in prime tourist locations such as islands and near beaches.

Land productivity. As land productivity increases, the demand for land increases as forgers try to maximize profits. However, subsistence farmers need less land to meet basic food requirements. Conversely, if land productivity decreases, subsistence farmers need more land to support them, while profit-oriented farmers have less incentive to invest in new land. The aggregate of land productivity therefore depends on the proportion of subsistence farmers to commercial or profit-oriented farmers.

Crop prices. Higher crop prices make it profitable to clear new land, some of which may have been economically inaccessible in the past. For commercial farmers, the effect of crop prices is similar to the effect of land productivity. Most of the agriculture expansion made possible by clearing forests has been aimed at increasing the production of upland cash crops.

Off-farm employment and income. Industrialization of the economy provides alternative income-earning opportunities and reduces the demand for land, In an open, diversified cash economy, food can always be purchased and exchanged for other goods that are being produced.

Forest accessibility. The accessibility of the forest affects both logging and land clearing through the profit-maximizing behaviour of the logger and the farmer. The most easily accessible forest is logged or cleared first, and as time goes on, the remaining forest may simply become more and more economically inaccessible. This slows down deforestation, whereas the opening of new roads in connection with logging or infrastructure building increases the demand for new land.

Wood demand and prices. High demand for tropical hardwood for industrial or indigenous consumption and high wood prices are likely causes of deforestation. However, the areas harvested officially were not large enough to explain the high rate of deforestation, even if the logged-over areas had not been property regenerated. Logging probably had a greater effect on deforestation indirectly, by the construction of roads which made the forest easily accessible.

Population growth. Population acts as a demand shifter for new land or for more wood. In regions of high population density, one would expect the relative forest cover to be smaller, assuming the other factors to be equal.

9.2.2 Community Use of Forest Products

Local villagers collect a wide range of non-timber forest products, medicinal plants and fuel wood in most protected areas, and a small minority fell timber and shoot wildlife.

The socio-economic dependence of local people is well illustrated around Khao Chamao-Khao Wong National Park. Products harvested from the PA forest include herbs, wild fruit and vegetables, bamboo, bamboo shoots, mushrooms, and edible insects. Some of these products are harvested from park areas illegally. In 2002, 18 villages occupied the areas surrounding the park with a population of 12,082 and 2,727 households (ICEM, 2003g). Average income per household is approximately 101,700 baht per year, while the average value of forest products consumed per household is 265,000 baht per year. The value of consumed NTFPs is more than twice the average income demonstrating the importance of the informal (i.e. non-commercial) economy to the local community and local community dependence on forested areas. Similar observations were made in a study on socio-economic land use and dependency of the community surrounding Khao Kitchakut National Park in Chanthaburi Province (Piyavatin 1999).

9.3 Achievements

9.3.1 National logging ban

The Logging Ban of January 1989 was a momentous event for the conservation of the country's natural forests. Since 2001, a ban on logging in mangrove forests has also been imposed. Enactment of the logging bans reflects a growing understanding by the government, private enterprise and the general public regarding the vital conservation value of forests for economic development. Previously, this long-term perspective tended to be eclipsed by a focus on short-term profits from large-scale commercial logging.

9.3.2 New forest conservation policies

Following the logging ban, successive governments took actions to enhance protection of remaining forest resources. A first step in designating further important forest habitat as protected areas necessitated a system of forest land use zoning. Consequently, in 1992 the Cabinet passed resolutions to conduct land use zoning of lands designated as National Reserve Forest under the National Reserve Forest Act of 1964, some of which had already been incorporated in the protected area system. Subsequently, government approved the zoning of about 88.23 million *rai* (27.56 per cent) of the country for conservation forests (Zone C – Conservation), 51.89 million *rai* (16.16 per cent) as production forests (Zone E – Economic), and 7.2 million *rai* (2.21 per cent) for land reform (Zone A – Agriculture). In 1999, Cabinet endorsed the NBSAP (titled National Policies, Measures and Plans on Conservation of Biological Diversity), and again in 2002 following revision and amendment.

9.3.3 Research in forest conservation

Several key studies pointed to the need for a goal of 40 per cent of the country to be protected under forest cover. First, a water yield study recommended that 38 per cent of the country, specifically the head watersheds should be under forest to maintain the required annual flow. Second, a timber trends study reviewed the national timber requirement and found that self-reliance would require a major increase in forest cover. Third, two studies were undertaken on land suitability and land-use planning and recommended that 47 per cent of the country should be under forest cover for preservation and development purposes (Ministry of Agriculture and Co-operatives 1993).

9.3.4 Reforestation Campaign

In December 1992, Her Majesty Queen Sirikit expressed concern about deforestation and severe droughts in Thailand, and the desire to initiate an extensive reforestation campaign. The National Forestry Policy Committee drafted a proposal (the Reforestation Project in Honour of the Golden Jubilee of His Majesty, the King of Thailand), which was approved by the government in February 1994. A target area was set of 5 million rai or 2 million acres during the period 1994-1996. One of the key criteria for site selection was no conflict over land occupied by villages. Cabinet also approved the budget for RFD to produce seedlings.

In June 2002, RFD reported on the success of the campaign. In protected areas a total of 5,517 square km (3,448,253 rai) were replanted by the private sector or with private donations. The Department also enriched 268 sq km inside protected areas. A further 2,213 square km of degraded forest land were regenerated. Outside protected areas, 74,587 kilometres of roadside were planted with trees and 1,403 square km were planted in temple grounds.

These significant achievements helped to consolidate the conservation ethos among the Thai people.

9.3.5 Reforestation outside the protected area system

The logging ban in 1989 was followed by a wave of related legislation, policies and cabinet resolutions. Foremost among the legislative documents is the Re-Afforestation Act 1992.

The Re-Afforestation Act was promulgated to support private reforestation of restricted tree species such as teak and dipterocarps by the private sector on private land. The Act describes the types of land on which forest plantations may be registered and established. At the time RFD was reorganised, the Reforestation Office was established, comprising: (i) an administration section, (ii) the Private Reforestation Division, (iii) the Forest Nursery Division; (iv) the State Reforestation Division and (v) the Forest Community Division.

9.3.6 Community involvement in forest management

Beyond PA boundaries collaborative approaches to forest management have been demonstrated in regions of the country where a tradition of community forestry has been maintained for centuries, particularly northern Thailand. A number of innovative watershed and buffer zone management projects including those supported by the Royal Project Foundation, bilateral donors and non-government organisations in conjunction with RFD, are demonstrating the effectiveness of integrated conservation and development approaches for watershed management.

Although never formally endorsed, the Thai Forestry Master Plan (1993) reflected an important shift of emphasis towards local communities. The Plan pointed out that RFD could no longer shoulder the full responsibility of protecting all remaining forest resources. It argued for a new partnership between the Department and forest users.

9.3.7 Forest Complexes

RFD was especially innovative in promoting the "Forest Complex" approach to PA management. The Department defined seventeen terrestrial forest complexes and two marine complexes. The EU is funding a project targeting the Phu Khieo Complex in North-eastern Thailand and the Danes have supported a project focussing on the Western Forest Complex (Box 6).

Box 6. The WEFCOM Project

The WEFCOM project demonstrates integrated ecosystem management in the Western Forest Complex, comprising eleven national parks and six wildlife sanctuaries. One main objective of the project has been to develop eco-system management guidelines for the complex. Rapid assessment of flora, fauna, socio-economic conditions and recreation have been carried out in the whole complex and data analysis has led to ecosystem zoning of the area as follows:

Zone 1: Strict Nature Preservation and Protection Zone

Zone 2: Nature Protection Zone

Zone 3: Nature Education and Recreation Zone

Zone 4: Controlled Utilisation Zone

Guidelines have been prepared for each zone with the intention of assisting each PA to prepare operational management plans based on the zoning scheme. Provincial Conservation Forums have been established in all six provinces and become a focus for local participation in the conservation of WEFCOM, including specific conservation initiatives and discussion of overall resource-use plans. Also, PA management committees have been set up in two PAs with similar structures planned for all other PAs within the complex. The government is receiving continued support from the Danes to expand the ecosystem and collaborative approaches to PA management throughout the Complex and to other Complexes in the country.

9.4 Challenges

9.4.1 Understanding the development values of forests as protected areas

Forest PAs provide many development benefits to industry, urban areas, agriculture, aquaculture, and other sectors (ICEM 2003g). Those benefits are not reflected in sector plans and budgets or in PA management plans. Research institutes should pay more attention to conducting socio-economic research, and incorporating financial assessments in planning and management of protected areas. For example, technical sections within DNWP and RFD should be encouraged to conduct research into watershed values and NTFPs and their economic significance. Better understanding of the development benefits of PAs should be reflected in environmental assessment of development proposals. The guidelines on mining in protected areas, for example, need to be re-assessed in light of appropriate zoning plans and regulations which seek to maintain forest ecosystem services and products.

MONRE should recognise the significance of protected area management for socio-economic development, and reflect on the quality of data currently being produced - and interpreted - in management plans. Establishing a socio-economic division within DNWP should be considered to address these issues including hiring staff with social science backgrounds.

9.4.2 *Forest restoration and rehabilitation in environmentally sensitive areas*

Present waterways tend to be overlooked as targets for forestry interventions. In some countries, the zones on either side of rivers and streams are designated as protected areas. Historically, they have been areas of high population density and highly degraded habitats. Appropriate reforestation strategies are needed for riverine and wetland environments to enhance conservation and development benefits. Similarly greater attention should be given to establishing forest corridors between PAs within forest complexes.

9.5 Future directions

9.5.1 *Forest zoning for sustainable multiple use*

Forest areas provide diverse benefits on a sustainable basis, assuming proper management and a balance between conservation and use. MONRE could implement and support research to determine more specifically forest areas essential to conserving critical natural resources and biodiversity. Other areas could be zoned for a range and gradation of multiple uses, each associated with specific guidelines and regulations aimed at ensuring the maintenance of resource productivity and ecological integrity. Another important area for study relates to methods for determining the levels of use desirable and sustainable for a given zone.

9.5.2 *Community forestry*

Community forestry is a form of forest management currently on the horizon in Thailand. Once the Community Forestry Bill is passed into law, it will become an important element in the Kingdom's forest management strategy. Community forestry can address the national interest to conserve and rehabilitate forest areas, while responding to the needs of poor rural communities to use and protect forests which contribute, directly or indirectly, to their livelihoods. Since there are still human settlements within protected areas, PA planning should account for their needs. Appropriate rules and regulations should be formulated regarding the negotiation and implementation of community forest management agreements. Procedures for monitoring whether or not agreed regulations are being adhered to need to be defined, along with sanctions stipulating penalties for non-compliance.

9.5.3 *Establishment of forest corridors*

Thailand's recently defined forest complexes represent an important step forward in achieving regimes of protection across landscapes. There is a need to identify habitat corridors linking PAs in which inconsistent uses are relocated and where specific regulations could bring existing uses into compliance with conservation objectives. Resources would be required to compensate displaced users, or others whose existing use patterns and income would be negatively impacted by conservation zoning.

9.5.4 *Ratification of the International Convention on Biological Diversity (CBD)*

Thailand ratified the CBD in 2003. Ratifying nations are eligible for funding from the Global Environment Facility to assist in complying with the convention. Donors now classify Thailand as a Newly Industrialising Country (NIC), and aid for environment and development activities in Thailand has diminished. However, there are significant expenses associated with efforts to improve the effectiveness of protected area management. Becoming a party to the CBD and actively participating in its forums and networks will contribute to improving the effectiveness of forest and national protected area management (NESDB and ADB 2001).

9.5.5 Transboundary protected areas

MONRE recognises that many critical ecosystems cross international boundaries and that effective conservation within Thailand will require close cooperative management of those shared systems with its neighbours. Already there has been Ministerial level discussions with Myanmar, Laos PDR, and Cambodia to explore approaches to cooperation on transboundary protected areas.

An important existing effort is underway with Myanmar to conserve the Tenasserim Mountain Range which forms the backbone of mainland Southeast Asia's largest tract of intact natural forest. Covering more than 60,000 km^2, the region straddles the border of Thailand and Myanmar and includes the only Natural World Heritage site in these two countries. This site is part of the Western Forest Complex in Thailand. The area supports globally significant biological diversity including the world's second largest tiger population.

Thailand has established a special project to create a sustainable network of partners to secure long- term conservation in this region in recognition of its biodiversity values and the critical watershed and other ecological services it provides for large areas in Myanmar and Thailand. In 2003 a meeting took place involving both governments and local and international NGOs to begin putting in place a transboundary landscape conservation strategy. Exchange visits are planned including a study tour for Myanmar wildlife staff to learn more about the Western Forest Complex and the WEFCOM Ecosystem Management Project.

Thailand has also launched the Patam-Khaeng Tana Transboudary Conservation Project on the Thai-Laos-Cambodian border. Patam and Khaeng Tana are existing National Parks and early work has focussed on biodiversity and social surveys in Thailand.

MONRE should define similar transboundary conservation strategies with neighbouring governments and the international community for all important shared ecosystems, especially where existing protected areas on the border provide an institutional and management framework for initial cooperative action.

10 Water resource management and protected areas

10.1 Current Relationship

Protected watersheds and natural wetlands play vital roles in the management of national water resources. Yet, the quantity and quality of water resources in Thailand have been deteriorating due to the destruction of watersheds and wetlands, and agricultural and industrial pollution. Thailand already faces severe water shortages in some regions and in coming decades these constraints are expected to become more serious and widespread due to projected increasing water demand (Prajamwong 2002 cited in Somkiat 2002). Table 11 shows projected changes in water demand per economic sector from 1993 to 2006 (RID 1998).

Table 11: 1993 Water demand and 2006 projected demand in Thailand (million cubic metres)

Sector	Water Demand 1993		Water Demand 2006	
	Volume	Percent	Volume	Increase
Domestic	3,118	3.5	6,593	3,475
Industry and Tourism	1,311	1.5	2,154	843
Irrigated Agriculture	48,172	54.3	61,747	13,575
Power Generation	20,767	23.4	23,425	2,658
Maintaining Downstream	15,326	17.3	15,434	108
Total	88,694	100.0	109,353	20,659

Source: Thailand Water Resource Development Master Plan, Royal Irrigation Department 1998.

To establish a basis for improved water management, Thailand has been divided into 25 river basins according to topography and catchment location. River basins have become the fundamental unit for national water resource planning.

Annual rainfall storage in Thailand averages only 30 per cent of rainfall volume, with 70-80 per cent concentrated during four rainy months. As population increases and industry continues to expand, there is a steady decrease in the runoff per capita. Dry season flows are the critical variable, since water deficits are only pronounced during the dry months and are worsening over time. Efforts to increase water availability are therefore focused on improving dry season flows.

There are three ways to accomplish improved dry season flows. First, watershed conservation areas must be effectively managed. This means ensuring the maintenance of sufficient vegetation cover, or implementation of land and soil conservation methods that enable rainfall to infiltrate to subsurface aquifers rather than accumulate as surface runoff. Thailand's extensive areas of degraded watershed would need to be rehabilitated. Second, reservoir storage capacity needs to be augmented. Third, dry season water use should be reduced and water conservation measures implemented. This is likely to become an increasingly important feature of Thailand's water resource management

and development strategies in the future. To some extent, this will depend upon the implementation of incentive and disincentive measures for limiting water use. A system of water pricing has been considered. However, it has so far been discounted as viable means to accomplish water conservation objectives because of potential impacts on poor small-scale farmers. Inevitably, some form of user pays approach which takes into account equity considerations will be needed so that water consumers contribute to the protection and maintenance of the resource.

10.2 Issues

10.2.1 Watershed degradation

Farming on sloping lands has resulted in severe soil erosion. Thailand's watersheds have been damaged extensively resulting in an exponential increase in sediment transport to drainage channels and reservoirs. The cost of watershed deforestation and subsequent sedimentation to hydro-power facilities is estimated to be US$185 per hectare (Costanza et al 1997). Applying this rate, deforestation in watershed catchments associated with hydro-power facilities in Thailand between 1961 and 1988 resulted in a loss to the country of more than US$6 billion.

10.2.2 Occupancy of watersheds by ethnic minorities

For hill tribes, such as the Karen, Hmong, Lahu, Akha and Mian, the watersheds are their home and an intrinsic part of their cultural landscape. While some hill tribes have practiced an ecologically friendly method of rotational shifting cultivation, others practiced slash and burn techniques that causes adverse environmental impacts on upland watersheds (Srimongkontip 2000). Determining how to accommodate protected area enclave communities, particularly those who have long been resident in upper watersheds of the Northern Region, is a pressing problem. Some of these watersheds continue to degrade as a result of unsustainable uses. Also, large numbers of refugees from neighbouring countries remain a problem, for example, the camps for refugees from Myanmar in the Western Forest Complex.

10.2.3 Potential damage to catchments from construction of water storage facilities

A number of new water storage facilities are planned for several watersheds. However, construction plans are facing public opposition. Public awareness of watershed management issues has grown in recent years. The Thai public now attributes much of the prior damage to watershed areas with construction of water storage facilities for irrigation and hydro-power. Establishing reservoirs inside or nearby protected watersheds has resulted in their degradation due to improved access for illegal loggers.

According to the Water Resource Development Master Plan, water demand is projected to increase nearly 25 per cent over the next 14 years. Additional storage units including dams, weirs and improved gate regulators are among the new structures that are likely to be required to alleviate projected dry season water deficits. Yet locating storage structures in forests can alter the flow regime when some 30 per cent of the forest area in a given watershed is converted for cultivation or other purposes. Forest conversion in any watershed region shortens the amount and timing of water flow in the summer season (Tangtham 1991).

The contentious Keng Sua Ten Dam Project in Prasae Province would inundate thousands of hectares of watershed forest. A Thailand Development Research Institute study indicated that, taking into account loss of forest and crops, the project would incur economic losses of US$26 million (Kaosa-ard 2001). The growing debate has led the Royal Irrigation Department to place a moratorium on the construction of dams opposed by the public.

The Prasae Dam project is also being considered to increase dry season water storage to supply agriculture, industry, tourism, and the domestic water requirements of nearby towns along Thailand's eastern seaboard. The proposed dam would be constructed at Wang Chan District in Rayong Province.

The dam has also been opposed by families who would need to be relocated from the inundation zone, as well as by conservation organisations concerned that the reservoir would facilitate improved access to the adjacent Khao Rue Nai Wildlife Sanctuary. As Thailand's water demands increase in relation to supply, these dilemmas will require considerable attention from policy makers and water resource engineers, accompanied by efforts to improve public understanding of the tradeoffs involved.

10.2.4 Social aspects of water resource engineering

While engineering aspects are central to the design of water storage structures, social aspects have become increasingly important. It has become difficult for government to propose or develop major infrastructure projects without the consent of local people. Social negotiating skills are now essential for project developers. But such skills have not yet become a part of their professional training or practice, especially for those involved in technical fields including engineers. Acquiring these skills is now a priority for government officials working at the public interface.

10.3 Achievements

10.3.1 Establishment of the National Water Utilisation Committee

The National Water Utilisation Committee has developed administrative subcommittees, rules and water utilisation regulations with the aim of maximizing the benefits of water distribution among users for the purpose of improving rural living standards. Setting up the Committee is a reflection of the increasing appreciation of multi-sectoral analysis in natural resource and environmental management.

10.3.2 Pilot National Water Resource Management Project

The pilot National Water Resource Management Project has two main objectives. It aims to provide training on water resource management and to support a revolving fund for trained water users groups to draw from for occupational development and improved water utilisation including vegetable cultivation, livestock rearing, fish raising and integrated farming (Agenda 21 2000). The Cabinet has approved a revision of watershed classification and associated regulations to conform more closely with the situation on the ground. Strict prohibition of all land use in Class I watershed has been reconfirmed. Various projects under the Royal Projects Foundation as well as RFD are helping to protect and rehabilitate critical watersheds while promoting environmentally sound occupations for watershed inhabitants.

10.3.3 Efforts to improve water quality

The World Bank *Thailand Environment Monitor 2001: Water Quality* report notes that the Thai government has put in place policies, plans and water quality standards. The government has embarked on an ambitious program for the management of water pollution generated from urban sources.

10.3.4 Measures to protect freshwater quality and supply

The Community Development Department of the Ministry of Interior has applied a number of measures to protect the quality and supply of freshwater resources in Thailand. They range from the acceleration of development and provision of water from suitable sources to the allocation and utilisation of seasonally available water resources.

10.4 Challenges

10.4.1 Watershed management and classification

Responsibility for watershed management in Thailand falls under the Watershed Management and Conservation Office within DNWP. The Office of National Resources and Environmental Policy and

Planning (formerly OEPP) established a Watershed Classification Scheme (Table 12) with guidelines for appropriate river basin management and land use (TDRI 2000). Class IA, which covers 16.7 per cent of total land area, is for strict protection.

In the north of the country, however, this area has been traditionally occupied by a number of ethnic minority peoples. Following introduction of the watershed classification a conflict ensued over the rights of people to reside on their traditional homelands and the national priority to preserve critical watersheds. While in principle communities have to be resettled to other areas outside the Class IA and IB watershed management zones, many remain. The challenge has been to enable them to continue living in these areas while also playing a role in watershed protection. In some cases, this has not been difficult as some of the minorities already practice strict watershed protection based on their cultural and belief systems.

Additionally, the shift from annual crop cultivation to tree crops on land being farmed throughout much of the northern region has contributed to stabilising local livelihoods as well as watershed ecology. While a Royal Project has made progress in developing integrated conservation and development systems among ethnic minority communities resident in northern watersheds, considerable work remains to be done to further improve the situation and to expand model approaches over a wider area.

These arrangements must include lowland populations who claim to be impacted by upper watershed communities. Recently, affected lowlanders have been involved in civil disobedience and crop vandalism in upland communities which they hold accountable for negative impacts on lowland irrigation systems. The Third Phase Master Plan for Community Development, Environment and Controlling Cannabis in Highland Areas (2002-2006) recognises these problems and includes policies aimed at addressing them.

Table 12: Watershed classification

Watershed Class	Area (square km)	Ratio (per cent)
1A	84,463.70	16.66
1B	7,626.66	1.48
2	42,768.62	8.32
3	39,283.77	7.65
4	81,033.69	15.81
5	251,483.62	49.01
Water bodies	5,434.96	1.07
Total	513,115.02	100.00

Note: Thailand occupies an area of 513,115.05 square km
1A is watershed class 1 containing intact forests prior to promulgation.
1B is watershed class 1 with secondary forests and cultivated area prior to promulgation.

Source: The Office of Environmental Policy and Planning 1996.

A recent Cabinet Resolution reconfirms the prohibition of settlement and land use in Class IA and 1B watersheds. However, since this decision is incompatible with the situation on-the-ground over a fairly extensive area and involving large numbers of ethnic minority people, a more comprehensive review of factors influencing management should inform appropriate amendments.

10.4.2 Conflicts over occupancy and forest management in protected watersheds

In the absence of any national processes for recognising local forest management agreements and regimes in Thailand, villagers, fieldworkers and local government officials are often left to settle conflicts over natural resource management on their own. Sharing and managing the benefits between upstream and downstream users of watershed areas is an increasing problem in Northern Thailand. Forest degradation, conflicts over water resources and increasing competition over land and natural resources, has exacerbated conflict between upstream and downstream people. The expansion of 13 national parks intensified the difficulties when more than 200 upland communities were relocated from their homelands (Srimongkontip 2000).

10.4.3 Enforcement of water quality control and wetland protection

The lack of integrated approaches combined with lax law enforcement, weak capacity, insufficient investment, and poor operations and maintenance systems have exacerbated the water resource quality and pollution problems. Limited community participation and low involvement of the private sector have tended to place the onus for water quality control exclusively on government (World Bank 2001). Efforts to conserve wetland areas which play a vital part in the water cycle and water resource management needs to be given higher priority in development planning.

10.5 Future directions

10.5.1 Establish watershed management committees

Community participation must be formally engaged in the management of watershed areas. Just as site level management committees are being established for selected national parks, watershed management committees should be established to resolve issues between local communities and government agencies for maintaining the integrity of watershed areas. Provisions are required for timely conflict resolution and ensuring sustainable economic development. The formulation of master plans for 25 river basins is envisaged, with pilot activities currently proceeding under the Department of Water Resources within MONRE. The master plans provide a common framework for integrated and coherent efforts by a range of relevant agencies for the watersheds within each basin.

10.5.2 Establish fire protection associations within local communities

Watersheds are severely degraded as a result of unnatural forest fire regimes. It is important that local communities, whose agricultural clearance practices are generally the cause of forest fires, are actively involved and encouraged through financial incentives to participate in forest fire management control.

10.5.3 Increase storage capacity without negatively impacting watershed forests

Thailand will need to increase its water storage capacity in order to meet future water demands. Careful consideration of where to site additional water resource facilities will be essential to ensure that the construction does not contravene the need to ensure subsurface aquifer storage by protecting watershed infiltration capacity. Responsibility for sustainable watershed management and protection will need to be shared with local communities under the auspices of the Community Forestry Law

10.5.4 Rehabilitate degraded watersheds

A considerable amount has been learned during the past decade or so regarding natural and assisted forest regeneration. These techniques could be applied to rehabilitate degraded watersheds, particularly in areas of the upper north where farmers increasingly have grown agroforestry cash crops as an alternative to shifting cultivation.

10.5.5 Increase water use efficiency

Water conservation presents significant opportunities for reducing Thailand's dry season water deficit. An acceptable complement of incentives and disincentives to prevent extravagant water usage would be likely to involve some form of water pricing system with a proportion of avenues going back to fund protection management. Appropriate water pricing arrangements would need to exempt poor farmers.

10.5.6 Reduce water pollution

To address water pollution problems, the World Bank has recommended that Thailand develop an integrated approach for the management of surface and groundwater resources involving:

- fostering local community participation in water resources management;
- harmonising functions and laws by addressing overlaps in institutions and jurisdiction, and gradually decentralising functions to local governments;
- improving the efficiency of budget allocation and rationalising investments for the wastewater sector;
- promoting opportunities for private sector participation; and,
- increasing public awareness about the state of water quality (World Bank 2001).

11 Energy development and protected areas

11.1 Current relationship

Energy demand is expected to increase substantially over the next decade. Options to address this demand will need to meet environmental, equity and economic imperatives. Increasingly, conventional energy projects are meeting public resistance because of their potentially damaging environmental effects. For example, two proposed clean coal burning power plants in Rachaburi and Prachuap Khirikhan Provinces south of Bangkok, and the Thai-Malaysian Gas Pipeline project in the far south, are currently stalled due to local opposition based on fears of adverse environmental impacts especially on subsistence fishing livelihoods.

Thailand has been engaged in efforts to reduce its energy requirements by implementing a national energy conservation program. The program has been partially successful, but there is significant potential for future reduction of energy demand through conservation and alternative energy sources including wind and solar power which are at early stages of research and have yet to be given much priority.

11.2 Issues

11.2.1 Increasing energy demand

Table 13 shows total energy consumption in Thailand since 1993. Despite a brief fallback from 1998-99, the trend toward increasing consumption resumed in 2002 rising to its highest historical level. Energy demand is likely to continue increasing in line with economic growth.

Table 13: Total energy consumption in Thailand (000 GWh) 1993 - 2001

1993	1994	1995	1996	1997	1998	1999	2000	2001
55.2	62.6	38.2	70.0	77.1	79.9	80.8	87.6	92.9

Source: Electricity Generating Authority of Thailand (EGAT) and National Energy Policy Office (NEPO).

11.2.2 Implications of increasing energy demand for protected areas

Increasing energy demand has direct implications for protected areas and the environment. Hydro-power has the potential to be a sustainable and environmentally benign energy source and government may need to consider small scale decentralised schemes. Inevitably, projects would need to be constructed in protected watersheds, most of which are covered by national parks or wildlife sanctuaries. Also, transmission lines often need to be routed through protected areas. Power plants running on fossil fuels can also have implications for protected and environmentally sensitive areas. For example, the recent proposal to construct coal burning power plants at Hin Krut and Bo Nok in Phetchburi Province was halted due to risks to the protected coastal and marine zone. The Thailand-Myanmar gas pipeline was constructed through a gazetted protected area despite opposition from environmental groups. Following the installation, the forest restoration program has been closely monitored by the local communities, NGOs and the Petroleum Authority or Thailand which is responsible for the project.

11.3 Achievements

11.3.1 National Energy Conservation Program

Energy conservation reduces pressure on biodiversity and protected areas. The National Energy Conservation Promotion Act (1992) has established guidelines for the commercial production and labelling of energy efficient electrical appliances. An Energy Conservation Fund was established under the Act to provide financial support to private and public sector organisations wishing to implement energy efficiency programs (TDRI 2000). The Royal Decree on Designated Buildings (1995) identifies the types of buildings required to implement energy conservation activities in line with energy conservation legislation and regulations. A public "Divided by Two" campaign aims to halve domestic energy use by using simple conservation measures.

11.3.2 Establishment and strengthening environment departments

The Department of Environmental Quality Promotion (DEQP), ONEP and the Pollution Control Department (PCD) have been established to develop legislation, policies, guidelines and programs to manage and improve the environment in Thailand. The Enhancement and Conservation of National Environmental Quality Act BE 2535 (1992) is administered by these Departments and was enacted around the same time as they were formed. Their mandates include the provision of inputs to national energy development planning processes to ensure that energy developments do not impact negatively on the natural environment.

11.4 Challenges

11.4.1 Reducing the negative environmental effects of energy development

It is vital that Thailand meet increased energy demands, but in a way which minimises negative environmental impacts. Otherwise, energy projects create indirect costs by adversely affecting other development sectors including fisheries, tourism and water resources.

11.4.2 Public participation in energy development planning

Increasingly, the Thai public expects to be consulted regarding the construction of large-scale developments that impact on their environment and livelihoods. Their right to a voice in such decisions is now enshrined in the Constitution. But government officials charged with project planning and promotion lack training in social facilitation and negotiation skills. Genuine and transparent public hearings could help to defuse public opposition to energy development projects which Thailand will inevitably require in the future.

11.4.3 Getting energy facilities to pay for the ecosystem services they receive

Many energy schemes depend on ecosystem services and products to operate. For example, fossil fuel plants are often water cooled and use natural water bodies to release heated effluent, and hydro-power requires water and well protected watersheds to function. Yet, those natural services and products are freely provided often at considerable costs to other sectors and communities.

11.5 Future directions

11.5.1 Institutionalise hydro-power water catchment charges

Hydro-power levies should become a standard policy tool in all hydro-power schemes and where they affect protected areas, revenues should go directly to conservation management. Such levies should be enacted in legislation to ensure transparency such that every hydro-power producer is treated similarly and according to the same conditions and standards.

11.5.2 Introduce conservation levies on all energy development

Introduce a system of charges and levies so that all forms of energy development pay for maintaining and protecting the ecosystem benefits they receive.

11.5.3 Contribute to conservation of PAs linked to hydro-power schemes in neighbouring countries

The Thai government prohibited the Nam Choan hydro-power scheme in Thung Yai Naresuan Wildlife Sanctuary because of its potential impacts on high biodiversity values. When Thailand imports power linked to PAs in other countries, there is an obligation to contribute to watershed and biodiversity protection. Thailand imports electricity from Lao PDR from the Nam Leuk and Nam Ngum hydro-power schemes, among others. It will also import electricity from the Nam Theun II Hydro-power scheme, located inside the Nakai Nam Theun National Protected Area. This site is of international importance for biodiversity. Thailand should make special provision for financial contributions to the cost of protection in these cases.

11.5.4 Develop sub-watershed conservation schemes

Watershed management has been carried out covering very large areas. Sub-watershed approaches may be required since solutions are more easily tailored to suit the specific requirements of diverse sites. Site specific approaches facilitate protection responses and community participation and the ability to capitalise on indigenous technical knowledge.

11.5.5 Energy conservation

While government has already taken steps to encourage energy conservation, significant potential remains to continue reducing energy demands by implementing a range of conservation measures. Low-cost loans and subsidies to industry and the public to promote investment in energy saving technologies should be considered. For example, economic incentives are needed for electricity co-generation, solar water heating and energy conservation measures for buildings such as efficient insulation and double-glazing.

11.5.6 Research on the relationship between protected areas and alternative energy sources

There is considerable scope for developing environmentally friendly alternative energy sources in Thailand and protected areas have a key role in providing the context for their development and management. Some research has already been conducted regarding site suitability for wind farms, and solar photoelectric power production. There is also potential for generating electricity from tidal flows. To stimulate the alternative energy industry, initially the government would need to allocate funds for research, and provide tax incentives and cost subsidies for both developers and technology end-users. The use and establishment of special protected areas and zones for the purpose needs to be explored.

11.5.7 Energy-related EIAs in protected area legislation

Energy proposals having potential to affect protected areas should be subject to environmental impact assessment before they are adopted, and the results should be taken into account in the decision-making process. Although this issue is referred to under the Environment Act 1992, PA managers should also be empowered to influence these developments. In instances where an energy project is permitted, the proponent should be required to plan and carry it out in close consultation with PA authorities to minimise adverse effects and take preventive and remedial action.

12 Tourism and protected areas

12.1 Current Relationship

Thailand's physical and ethnic richness has placed it among the world's premier tourist destinations. Tourists have always placed a high value on the aesthetic beauty of the kingdom's environment, particularly its beaches, seas and mountains. With ecotourism now the fastest growing sector of the global tourism industry, Thailand stands to gain significant economic benefits by safeguarding the integrity of its environment.

The number of tourists coming to Thailand has increased steadily from 1.2 million in 1977 to 7.44 million in 1996. By 1996, the collective expenditures of international tourists to Thailand increased to US$11.25 billion, becoming the country's primary source of foreign exchange (TDRI 1997). Economic growth over the past two decades has also been accompanied by a rise in domestic tourism expected to account for a greater share of tourism-related expenditures than foreign visitors. Overall, tourism income contributes 5.4 per cent of the country's GDP – higher than for any other ASEAN country except Singapore.

Development of the tourism industry in Thailand is mostly a result of private sector investment. The public sector has not kept pace with the industry's growth by upgrading infrastructure such as roads, telecommunications and water supply facilities. In certain areas, water allocation, waste disposal and the safety standards of public facilities are inadequate for the local population, let alone tourists visiting villages and towns. In Phuket, one of Thailand's prime southern tourist destinations, water consumption has risen to 200 litres per person per day, while authorities have been able to supply only 27 litres per person per day.

Overall, management of tourism's rapid expansion has been less than rigorous. Tourist infrastructure development has often been associated with negative environmental impacts and a serious degradation of the natural assets tourists have come to enjoy. Sewage and pollution control systems are often substandard, leading to the deterioration of near-shore environments. Coral reefs have been severely damaged in many areas due to careless boat anchorage and poor management.

12.2 Ecotourism

There is an increasing interest among tourists in visiting undisturbed natural areas to experience spectacular scenery and wildlife. In Thailand, for example, visits to Thai national parks increased approximately 35 per cent between 1995-1999, from 11.5 million to 15.5 million persons. Ecotourism can bring high profits since tourists are often prepared to pay high prices for modest accommodation, keeping capital investment and infrastructure requirements low. Even a decade ago, the estimate of financial flows from developed to less developed countries from ecotourism reached US$ 25 billion per year (Elliott 1993). Ecotourism in Thailand has recently been the fastest growing tourism subsector with an estimated annual growth rate of 10 to 15per cent over the past few years. This growth trend is expected to continue.

Recently, RFD and Tourism Authority of Thailand (TAT) embarked on a joint strategy to develop the ecotourism potential of Thailand's National Parks. TAT has defined ecotourism as: a visit to a particular tourism area

with the purpose of studying, enjoying and appreciating the natural and social environment based on knowledge and responsibility for the local ecosystem. TAT is promoting ecologically sustainable tourism. In June 2002, an international convention on ecotourism and adventure travel was held in Bangkok.

However, there is wide spread misinterpretation of the ecotourism concept, and therefore, the strategies required for its development. The overriding perception in the industry is that ecotourism means offering tourists opportunities to appreciate Thailand's exquisite natural attractions. Considerably less emphasis is placed on how appropriately to design and manage tourism infrastructure and services to ensure that the environments on which revenues depend will be preserved over the long-term. Box 7 provides another example of the cost of poorly planned tourism.

Box 7: The cost of poorly planned and managed tourism

Pattaya is a good example of the environmental and economic consequences of unmanaged, uncontrolled tourism. Originally a small fishing village, Pattaya turned into an internationally known seaside resort in the short span of twenty years. At present Pattaya is second only to Bangkok in the number of tourists it receives. The city's earnings from tourism in 1991 were 15,000 million baht (US$600 million) or 15 per cent of total national tourist income. Yet, environmental pollution and destruction has reduced Pattaya's attraction as a desirable tourist destination. Research conducted by the National Environment Board shows that since 1986 the quality of marine water at Pattaya has dropped below the acceptable standard, due to poor rubbish and waste water management; and only 10 per cent of the coral reef east of Lan Island (near Pattaya) remains. Uncontrolled construction along the beachfront has further reduced the natural amenity of the area. These environmental concerns resulted in a dramatic decrease in the numbers of tourists visiting Pattaya since 1987.

12.3 Tourist willingness to pay for conservation and environmental quality

While revenues from nature based tourism are already significant and growing in Thailand, various studies have shown that tourists would be prepared to pay much more for the experience if the addition went to conservation and maintenance of the natural assets.

***Koh Samet Marine National Park*:** Approximately 250,000 visits are made to the Koh Samet Island each year. The recreation benefits of the park are estimated to be 2,709 baht (US$67) per person per year for Thai visitors and 12,808 baht per person (US$305) per year for foreign visitors (Israngkura 2001). Combined recreation benefits to the private and public sector exceed US$35 million. By applying the contingent valuation method, it was found that foreigners are prepared to pay an entrance fee of 452 baht (US$10), while Thai visitors are willing to pay 95 baht (US$2). This would result in a substantial increase in the park's direct revenue stream.

Phi Phi Islands National Park: In 1998, over 150,000 tourists visited the Phi Phi islands, 85 per cent of them foreign, but the reef and terrestrial systems are rapidly degrading. Total revenue from tourism is about 70 million baht (US$ 1.75 million) a year for domestic visitors and 8,146 million baht (US$ 203 million) a year for international visitors.

When domestic and international visitors were asked whether they would be willing to pay an additional amount to a trust fund to restore and conserve the coral reefs at Phi Phi island it was found that they were prepared to pay around 287 baht (US$ 6.5). From this the total value of Phi Phi's coral reefs was calculated to be 5.89 million baht (US$ 0.147 million) a year for domestic visitors and 49.6 million baht (US$ 1.24

million) a year for international visitors. The willingness to pay of domestic vicarious users was 634 baht (US$ 15.85) and the total economic value (use and non-use) of the reefs was estimated to be 19,895 million baht (US$ 497 million) a year (Seenprachawong 2001).

Khao Yai National Park: The Thailand Development Research Institute and Harvard Institute for International Development have estimated economic values for Khao Yai National Park (TDRI-HIID, 1995). The researchers applied several methods in the original study. To estimate the direct use value of Khao Yai National Park, the researchers used the "travel cost method". Depending on the statistical form of the model applied, they derived estimates of consumer surplus per traveller of 869 baht or 1,190 bath per year. They also applied a "contingent valuation" model, and estimated the total "willingness to pay" by users of the park at 1,696 million baht (US$37.7 million) per year. Non-use values were estimated at 1,008 million baht (nearly US$ 25 million) per year.

Khao Chamao - Khao Wong Terrestrial National Park: Field studies at Khao Chamao - Khao Wong National Park also illustrate the economic contribution of terrestrial and marine national parks. In 2001 there were 314,071 visitors and income from entry fees was 583,670 baht. In addition to entry fees, a survey of park users indicates that visitors to the park spend another 200 baht per visit, consisting of approximately 100 baht for food, drink and souvenirs within the park and 100 baht in nearby shops and facilities. Those expenditures amount to about 77 million baht (nearly US $2 million) per year.

The economic value of the park and its potential revenue stream, however, exceeds current tourist expenditure as visitors to the park are prepared to pay more than the actual costs incurred. Based on willingness to pay analysis, the use value of Khao Chamao-Khao Wong National Park is 427 million baht (US$9.5 million) per year. Non-use values are estimated as 252 million baht (US$6 million) per year (ICEM 2003g).

At Khao Chamao-Khao Wong National Park, the park managers have recognised that pressure from tourism is posing difficulties in maintaining the quality of the ecosystems. To maintain the ecological and economic values of a park, visitor numbers need to be more actively managed. One way is through a pricing structure that better reflects what tourists are willing to pay for conservation activities.

12.4 Issues

12.4.1 Reconciling the mandates of TAT and DNWP

In accordance with national economic policy focussing on the tourism industry, in October 2003, the Ministry of Tourism and Sport was set up. The goal of the Ministry is to promote and develop Thailand as a prime tourist destination in Asia to ensure continuing growth of the tourism industry. The new institutional arrangement divides tourism functions between the Tourism Authority of Thailand (TAT) concerned with tourism promotion, and the Office of Tourism Development, concerned with overall development of the tourism sector. Both agencies need strong support in their implementation of environmental and social policies within the sector. Changes in attitude and approach are required to develop environmentally and socially responsible tourism, and this will take both commitment and time. Among DNWP's core objectives are the conservation of protected areas and prevention of improper extraction and uses. The Ministry of Tourism and Sport and DNWP need to work together closely on nature based tourism policies, guidelines and regulations and in the management of tourism development.

12.5 Achievements

12.5.1 Visit Park Thailand 2000

The RFD's Visit Park Thailand 2000 campaign represented an important emerging trend in the development of protected area tourism in Thailand. The campaign was a response to increasing demand for nature-based tourism as well as government policy to find ways of increasing tourism revenue. Visit Park Thailand 2000 reflected a significant shift in the policy of RDF to gradually opening up protected areas for tourism. The Visit Park Thailand 2000 campaign necessitated that RFD design effective PA management systems able to accomplish, concurrently, PA conservation objectives and revenue generation from ecotourism (Kaae and Toftkaer 2001).

12.5.2 Ecotourism for revenue generation and improved park management

Most of the revenue from nature based tourism has accrued to private businesses. Government has begun to consider seriously how the protected area system could generate tourism revenues for the country, for local livelihoods and for improving protected area management. These developments are in their early stages, but they have stimulated national debate regarding appropriate design and means for establishing a sustainable ecotourism industry. These wide-reaching discussions have raised important issues. Strategies are beginning to emerge which could deliver financial contributions to improve protected area management, and at the same time, help to relieve the economic pressures on local communities which have led them to encroach on and illegally exploit protected areas.

12.5.3 Policy of sharing protected area tourism revenues with local communities

Until recently, park management strategies were based primarily on conventional conservation and protection concepts. While this strategy has been partially effective in some areas, it has also caused conflict between officers and local communities

Less environmentally sensitive areas provide opportunities for a variety of activities where conservation and tourism can be complementary. In the late 1990's, RFD developed a policy to share park revenues with local communities as a way of enlisting local cooperation on conservation and protection efforts. In addition to sharing park revenues with local subdistrict administrative organisations, RFD began recruiting park staff from local populations (Pipithvanichtham 1997). Hiring former hunters as park rangers has proven an effective way of enlisting local knowledge of wildlife and hunting to preserve critical habitats and apprehend poachers.

12.6 Challenges

12.6.1 Careful and appropriate design of ecotourism to ensure sustainability

Tourism development within protected areas must be carried out with great care if it is not to damage forests and wildlife or destroy the sense of wilderness most ecotourists seek. Inappropriate facilities have been built or proposed in Thailand's national parks to promote tourism. These include, for example, bungalow resorts at Koh Samet and Phi Phi Island. Such developments are inconsistent with the main function of protected areas which is to conserve forests, wildlife and unique scenery. Sustainable ecotourism revenues depend upon preserving those same values.

12.6.2 Community sustainability and ecotourism

Local communities usually do not sufficiently share the benefits of tourism development. While ecotourism could offer jobs and income for local people, not all local people benefit. Some, for example, are not inclined to abandon their customary rights and way of life in exchange for cash income. If not planned properly, nature based tourism initiatives could exacerbate economic inequities and conflicts, and bring about a range of undesirable socio-economic and cultural costs (Pleumarom 1997).

12.6.3 Developing high quality and appropriate protected area infrastructure and services

Park authorities would like to provide park visitors with appropriate facilities to enhance their enjoyment and appreciation of protected areas, while not causing negative environmental impacts. Budget limitations and a lack of skills in nature interpretation have constrained the provision of visitor facilities and services in protected areas.

12.6.4 Lack of sufficient stakeholder coordination in multiple use planning

A range of stakeholders use protected areas including tourists, local communities, government and state enterprise agencies including the military, EGAT and the Royal Irrigation Department, Department of Fisheries. These multiple uses have not been sufficiently regulated in the past, sometimes resulting in negative impacts on protected area resources, and often, in conflicts among stakeholders due to competing uses and ambiguities concerning jurisdiction.

12.7 Future directions

12.7.1 Planning, implementing and monitoring of tourism development to ensure environmental sustainability

The tremendous growth of tourism in Thailand has not been matched with official efforts to adequately plan, implement and monitor developments through administrative and legal mechanisms. Environmental and social impact assessments and monitoring procedures need to be set in place to prevent, as well as continuously track and make corrections when developments are causing deforestation, land deterioration, pollution and/or ecological disruption.

12.7.2 Collaborative protected area planning and management for tourism

Protected areas will increasingly be destinations for Thai and foreign visitors. DNWP will need to adjust its regulations, roles and functions to manage this trend. In theory, protected area tourism is an appropriate way to merge biodiversity and sustainable development objectives. However there must be caution to ensure that both objectives can be accomplished concurrently. This will require collaboration in planning and management among all involved stakeholders (Pipitthvanichtham 1997). Sustainable tourism recognises the contribution that people and communities, customs and lifestyles make to the tourism experience. It accepts, therefore, that people must share equitably in the economic benefits, and that developments are in harmony with nature and the wishes of local communities (Eber 1992). If local villagers share in profits (for example, through providing accommodation and serving as tour guides), living standards in impoverished rural areas could be enhanced. This would likely contribute to reducing encroachment, logging and illegal hunting. Ecotourists and villagers would become better educated with regard to conservation issues and therefore, more likely to help preserve protected areas as well as support improved protected area management.

Ensuring appropriate design of tourism developments, and appropriate sharing and re-investment of economic benefits are significant challenges. They can be addressed through stakeholder collaboration on planning and implementation. Community–based tourism is an emerging trend with potential positive

links to both conservation and rural development. Community-based tourism issues and approaches need to be better understood to enable potential benefits to be appropriately exploited, and ensure that potential negative impacts are pre-empted (RECOFTC 2000).

12.7.3 Enhance role for the National Protected Area Committee and Protected Area Management Committees

The National Parks Committee - established under the National Parks Act 1961 - seems to relinquish responsibility for marine and terrestrial national parks once they have become established. However, the management of protected areas requires a national advisory *cum* monitoring body in place, actively interacting on park issues. A national level protected areas committee, comprising representatives from all key government agencies (DNWP, TAT and OEPP), protected area experts and key non-government agencies would reinvigorate protected area management, and resolve unclear mandates between the stakeholders as they arise. They would also effectively act as a monitoring body on development in the parks, removing ill-conceived initiatives deemed to have severe impacts on the natural values.

PA management committees, already in place in a few parks around the country, should also have their roles clearly defined (through legislation). In this way, they can optimise local community and other local stakeholder involvement in park tourism activities. PA management committees also provide a forum for discussion of broader issues involving community livelihoods and the sustainable use of PA resources.

12.7.4 Using tourism revenues to improve protected area management

Budget for PA management comes from the central government as well as revenue from park entrance and concession fees. The central government budget allocated for park management has been limited as it competes with other development sectors. PA revenues need to be increased by raising entrance and concession fees consistent with willingness to pay surveys (Isarangura 1998). National park entrance fees were reviewed and adjusted in 2000, but still do not fully reflect park benefits and services provided (Pipitthvanichtham 1997). Also, the allocation and efficiency in use of this revenue needs to be monitored more systematically. Ecotourism should contribute to self-supporting national parks.

12.7.5 Public sector investment to improve protected area infrastructure

Sustainable tourism is tourism and associated infrastructure that, both now and in the future, operate within the natural capacities for regeneration and future productivity of natural resources (Eber 1992). More public sector investment and oversight is needed to develop infrastructure which is able to increase the ecological carrying capacity of portions of protected areas set aside for nature tourism (Box 8).

Box 8: Results of nature tourism survey at Doi Inthanon and Doi Suthep-Pui NPs

Nature tourists in Thailand rank wildlife conservation and watershed protection as the most important functions of national parks, surpassing tourism and recreation. Most tourists believe that construction of tourist facilities in protected areas including roads and hotels should not be permitted. Tourists are prepared to pay high prices for guided day treks to see wildlife in their natural habitats. Preferred activities among visitors include walking forest trails and visiting waterfalls. More than half of the visitors to Doi Suthep and Doi Inthanon are satisfied with existing accommodation, transport and walking trails. But most complain about the lack of information and facilities for viewing wildlife. Most visitors thought both parks had been spoilt by deforestation, pollution and tourism development.

Tourists want both an educational and recreational experience in national parks. Park infrastructure should be designed to reflect that demand. While visitor centres have been constructed at Doi Suthep and Doi Inthanon, they contain little information. Provision of maps, guidebooks, audio-visual presentations, exhibitions and competent information officers could generate additional revenues for conservation activities.

Development of extensive road networks or large hotels in national parks is not necessary to satisfy the demands of tourists. Development should concentrate on providing better information and facilities for viewing wildlife (for example, guided treks, trail networks, hides, salt licks). Forest restoration and garbage removal are also priorities.

Prices for park entrance suggested by foreigners and Thais respectively were 371 baht and 321 baht to see elephants, 280 baht and 230 baht to see gibbons and 287 baht and 260 baht to see Thailand's largest flower (1993 prices).

Source: Elliot 1993

13 Agriculture and protected areas

13.1 Current Relationship

Today, agricultural products account for the bulk of Thailand's foreign exchange earnings and are produced in such large quantities that the country ranks as the world's number one supplier of many commodities.

Protected areas serve agriculture in various ways, primarily, through the provision of reliable water resources, but also, through the delivery of detritus rich runoff which helps to maintain natural soil fertility. PAs occupy most of Thailand's upland catchments and provide centres for water storage and regulation for the agriculture sector which is increasingly dependent on irrigation. Biologically diverse forest areas help to maintain a pest-predator balance, reducing the need for expenditure on pest control, which increases the net profitability of agricultural enterprises. They also provide habitats for a wide range of pollinator species essential to many commercial crops.

13.2 Issues

13.2.1 Water availability for agricultural production

While agriculture continues to contribute significantly to Thailand's GDP, serious concerns are being raised regarding the long-term sustainability of the nation's agro-ecosystem management. Rice production, for example, is extremely water intensive and increasingly competes for water with industrial and domestic user demands, both of which are increasing. The result is less water available for agriculture, especially for dry season irrigated cropping.

13.2.2 Use of agro-chemicals

Past intensive use of agricultural chemicals led to widespread pollution of public waterways and subsurface aquifers, and a dramatic decline in the populations of freshwater fish and other aquatic wild food stocks. Toxic agricultural runoff in areas adjacent to and upstream of protected areas often threatens their ecological integrity. These impacts have been recognised. Major importers of Thai agricultural products including Europe, Japan and the United States, have been strengthening their import standards and decreasing acceptable chemical residue levels for imported foodstuffs. Government authorities and NGOs have been advocating organic farming methods but these have still to take hold in industrial agriculture.

13.2.3 Agricultural expansion into remaining forests and protected areas

Roughly two-fifths of Thailand is hill and mountain area. Estimates in the 1970s of overall land-use suitability classified 58 per cent of this area as cultivable compared with 24 per cent two decades earlier. Actual holdings of agricultural land – not all under cultivation at any one time – were estimated in the mid-1970s to occupy about 43 per cent of total land area. Thailand's impressive agricultural growth rate, averaging four per cent per year over the past decade, has been achieved largely through expansion of cultivated area. Government policies provided stimulus for a major increase in agricultural production by promoting agro-industrial technologies, effecting favourable changes in input and price controls, and providing irrigation and credit facilities. The resultant expansion of cultivated area and application of modern agro-industrial technologies caused a widespread conversion of forests to crop land and serious agro-chemical toxification of the rural environment and soil erosion in upper watersheds. In response, the Eighth National Social and Economic Development Plan stipulates a need for the country to focus on developing sustainable and environmentally sound agro-ecosystems.

13.3 Achievements

13.3.1 Participatory demarcation of forest boundaries

RFD and now DNWP have engaged in an extensive demarcation projects using government and international funds. Provisions for farmer and local community participation in demarcating protected area - agricultural land boundaries is reducing encroachment and boundary conflicts.

13.3.2 Sustainable agriculture policies and programs

Thailand's Department of Agriculture (DOA) has inaugurated a national Sustainable Agriculture policy under which major national extension programs supporting development of chemical-free farming and integrated pest management are being implemented. Integrated cropping to increase agro-biodiversity is gaining popularity in agricultural extension circles. DOA's policies and programs aim is to ensure the sustainability of Thailand's agricultural export sector, and limit negative impacts from agriculture on the environment and public health.

Additionally, the Land Development Department (LDD) is implementing an integrated program aimed at contributing to sustainable agricultural production. LDDs program includes: integrated landuse planning, development of land and water conservation systems, biological soil erosion prevention methods, development of integrated low-input cropping systems, crop selection for pest, disease and soil infertility tolerance, and on-farm tree planting and forest expansion through natural regeneration, reforestation, and community forestry (Agenda 21 2000). Many non-governmental organisations are providing support for the development of integrated sustainable agriculture. Increasing consumer awareness of the health risks associated with chemically contaminated foods has impelled private entrepreneurial development of chemical-free farming.

13.3.3 New Theory Agriculture

His Royal Highness, King Bhumiphol Adulyadej, has introduced a system of integrated and diversified agriculture known as "new theory". The system involves recycling of internal inputs and revolves around rainwater collection ponds used in both fish raising and supplementary irrigation. New theory agriculture aims to re-establish ecological balance, as well as local economic self-reliance to extricate farmers from serious indebtedness that has resulted from widespread investment in high-input, export-oriented cash cropping.

13.3.4 Increasing attention to farmer participatory planning in agriculture development

Agricultural extension in Thailand has often depended on transferring results from research stations to farms. The transfer process has often been unsuccessful because the conditions on-farm are so different from those found on the stations. In the context of its Sustainable Agriculture Program, DOA has begun to identify problems and potential solutions through farmer participatory approaches. These approaches elicit local experience and apply indigenous technical knowledge to identify appropriate solutions to farmers' problems. DOA then supports application of the solutions by farmers groups. The program is increasingly concerned with efforts to enhance agro-biodiversity.

13.4 Challenges

13.4.1 Encroachment on PAs due to expansion of agriculture

Thailand continues to lose forests to agricultural expansion. Annual field clearance through the use of fire often leads to the destruction of forests at agricultural field boundaries. Farmers then re-locate field boundaries into the areas where forests were excised. Although relatively small areas are added annually in this way, compounded over a decade or more, the process of erosion has excised a significant area

from the national forest estate. The use of influence to have protected forests re-zoned to agriculture is a continuing problem, as is land speculation by wealthy business people in areas set aside for land-poor and landless farmers under the national Agricultural Land Reform Program. The continued dislocation of landless farmers provides further impetus for them to open forest boundary areas to agricultural cultivation.

13.4.2 Erosion of agro-biodiversity

The emphasis on monoculture cropping for export as opposed to small-farm self-reliance through integrated cropping has significantly reduced the number of crop varieties being cultivated and overall agro-biodiversity. Monocultures are much more susceptible to pest attack which has led to an exponential increase in the volume and types of toxic agricultural chemicals being used nationwide. Chemical agriculture also has direct negative impacts on both floral and faunal biodiversity. There is a need to move towards a more integrated and biologically diverse agriculture. This would help to reduce chemical input requirements and could have beneficial impacts on a range of environmental parameters. There is also a need to establish protected areas over agricultural landscapes to conserve endemic agro-species genetic diversity and associated habitat.

13.4.3 Water conservation

Agriculture in Thailand is water use intensive, particularly given the extensive area given over to paddy production and the high water requirements for producing paddy rice, especially for the dry-season second and third crops. Efforts are being made (most notably in the production of horticultural crops including flowers and fruits), to use techniques for conserving water including heavy mulching, drip and spot irrigation. Considerably more will need to be done to reduce agricultural water use. Agricultural scientists have found that paddy rice outputs can be significantly increased by applying water conservation methods (Uphoff 2002). The introduction of regimes of protection on farms including planting of forest belts and small scale storage dams can conserve and regulate water as well as provide habitat and corridors for wildlife.

Thailand would stand to decrease its water demand for agriculture by applying these techniques, possibly even by as much as 50 per cent. Recent suggestions that Thailand adopt a user pays approach for managing and conserving water have met with serious opposition, particularly among low-income farmers. But user pays policies become necessary when watersheds within protected areas and upland forest require intensive management and controls to facilitate multiple uses as well as the maintenance and conservation of water resources.

13.4.4 Fire-generated impacts from agriculture

Fire continues to be a major threat to the integrity of protected areas and natural forest ecosystems, particularly in regions with prolonged seasonal changes. The regularity with which fires occur - almost annually in some reserves – can permanently change the structure of ecosystems. In this way, fire-sensitive evergreen forests and mixed deciduous forests are gradually converted to fire resistant dry dipterocarp forests. The biomass of dry dipterocarp forest or mixed deciduous forest is markedly lower, resulting in a diminished watershed capacity of these forest ecosystems and reduced biodiversity. Fire-induced bamboo forests have also expanded.

13.5 Future Directions

13.5.1 Participatory demarcation of protected area boundaries

Protected area boundaries throughout Thailand are poorly marked or not marked at all. Boundary designations have generally been the mandate of the RFD with little or no input from local people. In cases where they are clearly marked local people often disregard protected area boundaries. There is an urgent need to clearly define boundaries, which almost invariably, are contiguous with competing uses that pose ongoing threats to the protected areas (NESDB and ADB 2001). In 2001, as part of the Six Pilot National Parks Project, exercises involving local people in participatory boundary demarcation proved effective at gaining local respect for protected area boundaries. Once the boundaries are agreed based on local participation, the likelihood of encroachment diminishes. In cases where encroachment does occur, there are stronger grounds for the implementation of penalties and sanctions, again with the support and involvement of local communities.

13.5.2 Establish protected areas across agricultural landscapes

Attention is needed to identify and protect the centres of origin of plant and animal varieties as the richest source of genetic material. Increasingly, secondary areas of adaptation also need protection as places where local evolution of species has led to new cultivars adapted to local conditions. The maintenance of populations of local crop cultivars in the natural habitats where they occur is important to the long term development and economic competitive advantage of agriculture in Thailand.

The national system of protected areas should be expanded to include those natural areas and landscapes that are hotspots for crop species diversity. Such areas are inextricably linked to the maintenance of cultural and social diversity.

13.5.3 Involving local communities in forest fire management

As part of the PA management committee function, DNWP should give high priority to the formation of Fire Protection Associations within enclave villages and community development zones of nationally significant protected areas for the purpose of predicting, preventing, and managing and extinguishing forest fires. Priority attention should be awarded to protected areas with high biodiversity values which have regular forest fires or high risk of fire. Fire Protection Associations should be registered, ensuring that every protected area has recognised associations responsible for the protection of the reserves. Each Fire Protection Association must develop and apply a forest fire management strategy for its area and appoint a Fire Protection Officer.

DNWP should give financial or other assistance to the Fire Protection Associations for its activities, including preparation of firebreaks. Furthermore, a fire danger rating must be prepared and maintained on a continuous basis for the protected areas network in consultation with the Meteorological Department and the fire protection associations, dividing the country into separate regions in which the fire danger is usually sufficiently uniform to allow for a single rating which can be applied to the entire region. The duties of fire protection associations to prepare and maintain a firebreak must be clearly described. All registered associations must have equipment, protective clothing and training for readiness, actions and mutual agreements for fire fighting

13.5.4 Transition to sustainable agriculture

For the past few years, Thailand's DOA has maintained a policy of assisting farmers to make the transition to sustainable agriculture. Sustainable agriculture in watershed areas is particularly important to reduce soil erosion and to improve current soil and water conservation. The level of investment, however, has been relatively low, leading some to question the commitment to bringing about the desired changes in a

reasonable time period. Meanwhile, comparative advantages for marketing chemical residue-free produce nationally and internationally continue to grow. It is becoming increasingly clear that the movement toward a more sustainable and chemical free or low-input agriculture would have positive environmental and economic impacts. This shift is especially important for communities living within and upstream of protected areas.

13.5.5 Facilitating expansion of appropriate innovations through farmer networks

DOAs sustainable agriculture program places significant emphasis on the establishment of farmers groups. These groups are then amalgamated into self-help farmers' networks enabling farmers to learn from one another about experience developing appropriate sustainable agriculture innovations and how to manage them. Currently, facilitation skills among government staff remain insufficient for capitalizing on potential to enable farmers to assist each other on developing sustainable agriculture alternatives suited to their specific local environments. DOA and DNWP need to work together closely to establish such groups in PA communities and those with a dependence on PA resources and services.

14 Marine fisheries, coastal development and protected areas

14.1 Current Relationship

The richness of Thailand's fisheries resource is based on the contrasting oceanic systems of the Gulf of Thailand and Andaman Sea and their receipt of nutrients from extensive sea grass beds and mangroves. Sustaining the productive potential of both inland freshwater fisheries as well as near shore and marine fisheries depends on the protection of a range of ecosystem resources. For freshwater fisheries, these include water quality, freshwater mangrove and riparian forests, riverine rapid and shoal systems. For coastal and marine fisheries, mangrove forests, sea grass beds and coral reefs are vital for fish spawning, recruitment, maturation and nutrition. Brackish water aquaculture also depends on fresh water mixing to establish appropriate salinity levels. Watershed management and protection of fresh water terrestrial outflows are directly associated with maintaining the ecological conditions on which sustainable fisheries production depends.

Mangrove forests protect near shore economic investments including farm land from salt water intrusion and wind damage and maintain fisheries productivity as nurseries and refuges. In addition to supporting fisheries production, mangrove forests stabilise land-eroded sediments while their micro-organisms help to buffer marine waters from nitrogen-rich agricultural runoff. Direct uses of mangroves for subsistence as well as commercial purposes include: wood for charcoal, poles and traditional fishing gears; firewood; construction materials, wild food sources (for example, crabs, snails, and other edible species), and services such as education, recreation and tourism.

Sea grasses play a major role in the shallow water, inshore ecosystem as the primary producers in the food chain. Decomposed parts of sea grasses and products of sea grass metabolism are released into the seawater and transferred to the shore by wave action. These are the major contributors to the local carbon cycle and are a nutrient source for plankton. Sea grasses also provide direct food for fish, turtles, dugongs and sea urchins and other shellfish.

Coastal wetlands and freshwater swamps make important contributions to freshwater as well as brackish water and marine fisheries.

Coral reef ecosystems provide critical habitats for the wide range of species captured in their vicinity and beyond. Some 1,800 square km of coral reefs grow along Thailand's coastline in the Gulf of Thailand and the Andaman Sea (Burke et al. 2002).

Protected terrestrial forests serve fisheries through their delivery of fresh water to near-shore marine areas where salinity levels are buffered creating the proper environment for fish spawning and fingerling maturation.

While Thailand's fisheries maintained steady growth over the past decade, this has led to over-exploitation of the environment as well as fish stocks. Fisheries production is expected to plateau and then to decline because of increasing resource scarcity (Globefish 2001).

A decline in fishing stocks is already beginning to occur as indicated by the increasing investment of energy and labour required to maintain outputs. The cost of

production is increasing and relative profitability declining as greater demand is placed on the resource base. From 1985 to 1995 total marine catch increased from 15,977 t to 17,281 t, while the number of anchovy purse seiners rose from 197 to 375 and the purse seine fleet from 819 to 1,022 vessels. During the same period, gill nets for king mackerel, mackerel, pomfret, and crab also increased from 697 to 1,564.

14.2 Issues

14.2.1 Declining marine fish stocks

The rapid expansion of the commercial fishing industry has placed significant demands on available resources in the Gulf of Thailand and Andaman Sea. Fish stocks have begun to decline on the basis of declining output to input-output ratios. The declines are likely to continue unless restrictions are placed on the number of vessels permitted to continue large-scale and mid-scale commercial fishing. The impact of declining fish stock is felt by the industry overall, but most larger scale players survive because of their diversification into processing, shrimp farming, and other economic sectors. Adverse impacts are most felt by the artisan fishers who depend on catch from dwindling near shore stocks but have no alternative sources of livelihood.

14.2.2 Expansion of shrimp farms and destruction of mangrove forests

Over the past 15 years, Thailand's near shore brackish shrimp farming industry has grown exponentially. High and rapid profitability impelled rapid expansion into mangrove forest areas resulting in their widespread decimation. Intensive cultivation and poor management have led to major disease outbreaks. Most shrimp growers have reacted to these disease outbreaks by abandoning old infected ponds and developing new ones by opening up fresh areas of mangrove forest. Lack of control on pond expansion and concurrent forest destruction was facilitated by contrary policies between the Departments of Fisheries and Export Promotion which encouraged the growing shrimp export industry, and DNWP and DMC which are responsible for protecting the last remaining mangrove forest areas.

14.2.3 Destruction of mangrove forests due to tourism development

As the destruction of mangrove forests proceeded due to the expansion of the shrimp farming industry, Thailand's tourism industry was also experiencing a significant boom period. Again, inadequate control and the influence of wealthy investors contributed to further encroachment on and removal of mangrove and beach forests. Since mangroves are vital for the recruitment of subsequent generations of fish, revenue gains in the tourism and shrimp industries are likely to have negative offsetting losses in marine fisheries.

14.2.4 Use of destructive fishing gear

Net mesh sizes have been decreasing, and push nets and illegal fishing equipment destructive to coral reef and marine ecosystems have been on the increase as fishermen seek to ensure sufficient catch under declining availability. Current regulatory and enforcement mechanisms seem inadequate to stem the tide. Part of this problem can be attributed to lax enforcement on influential businesses.

14.2.5 Coral reefs threatened by human activities

An analysis by the World Conservation Monitoring Centre and World Resources Institute has found that 77 per cent of Thailand's corals reefs are threatened by human activities, with over 60 per cent in the Andaman Sea and close to 90 per cent in the Gulf of Thailand at risk. Overfishing and destructive fishing methods are the major threats, affecting about half of all reefs in the country while sedimentation and pollution associated with coastal and inland development affect over 40 per cent of Thailand's reefs (Burke et al. 2002).

14.2.6 Water pollution impacts on fisheries production

Industrial, agricultural and domestic waste effluents have become increasingly problematic. While the government ranks sewage-related issues as “important” or “very important”, they are poorly matched by mitigation strategies (Agenda 21 2000). Freshwater riverine and wetlands fisheries have been significantly impacted. Pollution impacts on marine fisheries are insufficiently documented, but marine scientists and near shore fishermen in areas where effluents are concentrated, (for example, the Eastern Seaboard), concur that fisheries are being severely affected. Wastewater standards were established in NESDP VII, the Environmental Law of 1992 and related regulations. However, performance has not kept pace with standards (Agenda 21 2000)

14.3 Achievements

14.3.1 Establishment of marine national parks

Marine national parks have been established in coastal and coral reef areas which provide habitat for more than 400 fish species and 200 species of hard coral. These areas provide refuges for a range of endangered marine species including whale sharks, turtles, manta rays and dugong. There are currently 22 national parks with a total marine and coastal area of more than 4,800 square km. Other areas in the Andaman Sea are being surveyed as potential national parks. National parks in the Andaman Sea are considered among the best diving sites in the world, and several others in the Gulf of Thailand including Ang Thong and Ko Chang are not far behind (Elliott 2001).

14.3.2 National Fishery Development Plan

To sustain the development of the fisheries sector and ensure its ongoing contribution to national food security and foreign exchange earnings, the National Fishery Development Plan envisages that total fisheries production should be maintained at not less than 3.5 million t/yr through sustainable fisheries development. Thailand has undertaken concrete efforts in this direction. Programs are being implemented to rehabilitate both marine and coastal fisheries through improved management, including a ban on cutting mangrove forests, prohibitions on a range of harmful fishing gear, mesh size regulations, prohibiting destructive fishing practices and introducing responsible fishing operations, reducing excess fishing capacity, restricting fishing seasons and areas, increasing artificial spawning and nursing grounds, improving post-harvest technology and strengthening institutional legal and financial frameworks (Globefish 2001). In 1992, the Cabinet Decision on National Policies, Measures and Action Plans on Natural Resources and Environmental Management for Coastal Areas and the Master Plan on Coral Management gave direction to conservation zoning and development controls.

14.3.3 Conservation of mangroves and other areas vital to fisheries productivity

In year 2000, the RFD announced a ban on further mangrove forest concessions to conserve the nation’s remaining mangrove forest area. Law enforcement and regulations are being revised to make enforcement more effective. Mangrove rehabilitation plans have been implemented and check points and mangrove forest protection units established.

Some coastal and marine areas have been given legal protected area status as Marine National Parks under the National Parks Act of 1961. The Fisheries Department has also endeavoured to close vital refuges and breeding grounds to fishing at crucial times during the year. The

Pak Moon Dam opened its gates to permit fish migration in 2001, with positive impacts on fish catch among artisan fishing communities located along the river. There is increasing recognition that the fisheries sector also benefits from the effective management of terrestrial protected areas and watersheds.

14.3.4 Decentralisation of fisheries management

In the context of the national decentralisation of responsibility for natural resources management, several programs are underway involving collaboration between the Department of Fisheries, non-governmental environment organisations, and local artisan fishing communities in the south of Thailand to protect key locations and sustain fisheries. The Pattani Bay Rehabilitation Project and the Sustainable Southern Coastal and Marine Management Projects (supported by the Wildlife Fund of Thailand) are providing useful lessons for wider application.

14.3.5 Ban on destructive fishing gear

The Department of Fisheries has recently been trying to outlaw the use of gill and push nets in response to complaints by small fishermen of declining near shore catch, and to reverse the apparent decline in fish stocks.

14.3.6 Release of fish fry to rehabilitate inland capture fisheries

Inland fisheries development focuses on intensification of fish stocks in public waters. In 1998, the Department of Fisheries released 650 million fish fry countrywide, with 720 million released in 1999. It is estimated that between three and ten per cent of these survive to food-fish size.

14.3.7 Efforts to make aquaculture outputs more environmentally sustainable

Thailand is trying to maintain its position as the world's top quality shrimp exporter to earn foreign exchange. A number of projects were recently initiated to increase environmentally friendly shrimp production. These include developing aquaculture techniques, registering shrimp farms, zoning cultural areas, co-managing irrigation, controlling use of agro-chemicals, and introducing product quality assurance.

14.3.8 Environmental planning for coastal and marine resource management

ONEP requires preparation of annual Provincial Environmental Management Plans. Guidelines for regulating land use in coastal and estuarine areas have been carefully set forth, but considerable work remains for implementation. Planned action areas identified in the National Agenda 21 include:

- Implementation of integrated coastal and marine management and sustainable development plans and programs at appropriate levels.
- Preparation of coastal profiles identifying critical areas including eroded zones, physical processes, development patterns, user conflicts and specific priorities for management.
- Prior environmental impact assessment, systematic observation and follow-up of major projects, including systematic incorporation of results in decision-making.
- Contingency plans for human induced and natural disasters.
- Improvement of coastal human settlements, especially in housing, drinking water and treatment and disposal of sewage, solid wastes and industrial effluents.
- Periodic assessment of the impacts of external factors and phenomena to ensure that the objectives of integrated management and sustainable development of coastal areas and the marine environment are met.
- Conservation and restoration of altered critical habitats.
- Integration of sectoral programs on sustainable development for settlements, agriculture, tourism, fishing, ports and industries affecting the coastal areas.
- Prior assessment of activities that may have significant adverse impacts upon the marine environment.

- Protection of the marine environment integrated into relevant general environmental, social and economic development policies.

14.4 Challenges

14.4.1 Enforcement of fisheries management regulations

Thailand has a range of regulations in place to address sustainable marine and coastal management issues and thereby to protect fisheries resources. Yet, the regulations are often poorly applied and weakly enforced. Overlapping jurisdictions for regulation and enforcement remain a stumbling block. The Department of Fisheries, Harbour Authority, DMC and DNWP share responsibilities with unclear or poorly understood designation of specific mandates. The resultant confusion leads to lax enforcement. Large scale fisheries enterprises are economically and politically powerful creating disincentives for strict enforcement of penalties or prohibitions. Patrolling staff, equipment and budgets are limited, exacerbating the already significant constraints to effective enforcement.

14.4.2 Management of protected areas to support sustainable fisheries productivity

The protected three kilometre exclusion zone on fishing, except to small scale artisan fishers, is poorly enforced. Marine National Parks staff are insufficiently equipped to detect and apprehend transgressors, even in the most sensitive areas protected by law. Better understanding of the detailed ecological functions of specific sites within National Marine Parks is needed to limit the area where patrolling and enforcement are essential to achieve protected area management objectives.

14.4.3 Sustainable aquaculture

The threat to Thailand's lucrative shrimp aquaculture industry remains as a result of poor pond management practice. Re-locating ponds into new areas is no longer a viable option given the ban on further cutting in mangrove forests. Importing countries are becoming stricter with regard to acceptable limits on chemical and antibiotic residues. Specific problem solving strategies to adjust tiger prawn zonation are not enough. There is a need to develop sustainable alternatives to current shrimp pond aquaculture management systems.

14.5 Future directions

14.5.1 Mangrove and coral reef rehabilitation

Mangrove forests have been damaged as a result of poorly controlled expansion of shrimp farms and tourism developments. Coral reefs have sustained damage due to illegal fishing and diving boat activities. Both ecosystems are vital to sustaining fisheries yields. The recent ban on mangrove deforestation is likely to prevent further encroachment by shrimp farms if sufficiently enforced. Greater efforts are needed to identify areas for replanting and to protect others where natural regeneration is still a viable option. Coral reef areas should be place strictly off limits to fishing. In cases where damage has already been significant, additional artificial reef development projects are necessary.

14.5.2 Integrated coastal zone management

The forestry, fisheries, industrial development, transport and tourism ministries should now collaborate to prepare and implement integrated coastal and marine management and sustainable development plans focussing initially on the designated coastal and marine complexes. A similar ecosystem planning approach to that being piloted for Forest Complexes should be applied for coastal and marine protected areas and areas vital for maintaining fish breeding stocks and recruitment. Consideration should be given to expand coastal protected areas to cover environmentally sensitive areas that maintain fisheries productivity.

15 Roads and protected areas

15.1 Current relationship

More than any other single factor poorly planned road development has been instrumental in reducing the extent and quality of Thailand's protected areas. Roads and transport play a critical role in the attainment of higher living standards. While roads through and within protected areas can facilitate efficient transport and PA management, they also place critical natural resource systems in jeopardy through direct physical impacts and by opening access to exploitation. Indirect damage can have more profound and lasting effects for conservation than direct damage.

Direct damage is caused by land consumption, removal of vegetation, and dissection of key habitats. Indirect damages include increased deforestation and influx of settlers. In areas where wild game is plentiful, new roads often lead to the rapid depletion of animals due to poaching (Sinha et al 1989). Indirect damages also include the generation of secondary roads, agriculture and aquaculture encroachment; "border effects" on forest ecosystems linked to sharp increases in exposure to light and modified atmospheric factors; disturbance of surface water flows; soil erosion; modifications to biodiversity; and the spread of diseases (ESCAP 1997).

Poorly designed, constructed and rehabilitated sites can lead to landslides and downstream sedimentation, affecting fish spawning grounds. Roads can create barriers to the movement of both terrestrial and aquatic animals. The blockage or restriction of animal migration is especially important and needs to be assessed for every road development project. The importation of new plant and animal species through road construction and use can have devastating impacts on native species which face competition from new arrivals.

15.2 Issues

15.2.1 Adequate assessment of negative impacts of road construction on terrestrial and aquatic habitats

Road planning within and near protected areas requires special attention and involvement of PA managers. Yet, they are not always brought into the process in the early stages, even when commitments are being made to major routes. MONRE will need to ensure that systems are put in place whereby any sector planning a road within a PA "complex" is required to consult DNWP from the earliest stages. Ultimately only complex wide planning will enable the adequate assessment of potential direct, cumulative and multiplier effects of major roads.

15.3 Achievements

15.3.1 EIAs of road construction in and around protected areas

Thailand has begun to take into consideration the potential negative impacts of road construction on protected areas. Prior submission of environmental impact assessments for road construction within or

traversing protected areas is required. Recent plans to construct a road crossing three protected areas in western Thailand (Mae Wong National Park, Khong Lan National Park and Umphang National Wildlife Sanctuary) were rejected based upon the potential negative impacts on ecology in this critical buffer zone of the Huay Kha Khaeng-Thung Yai Naresuan World Heritage Site.

15.3.2 Efforts to restore vegetation in areas degraded by road construction

Efforts have been made to restore areas destabilised by road development. While most replanting has involved use of exotic species, attention is now being given to the use of native species in rehabilitating ecosystem integrity.

15.3.3 Mitigation to protect wetland ecosystems

Wetland ecosystems are particularly sensitive to road development. To protect them, wetland areas are now regularly bridged instead of filled. Natural runoff is channelled through culvert systems which, though more expensive, help to preserve aquatic ecosystems.

15.4 Challenges

15.4.1 Pressures to construct roads through protected areas to improve motor access

As Thailand continues to develop, pressures to construct new motor routes through protected areas to reduce travel times will increase. The full environmental and development benefits and costs must be considered in the planning process.

15.4.2 More intensive management for existing road access to protected areas

In protected areas, special measures may be needed to prevent negative ecological impacts from existing routes. This is particularly important as Thailand gears up for ecotourism activities which envision larger numbers of visitors to protected areas. Intensive management will be required, for example, to control the movement of tourists and prohibit hunting, transport of hazardous substances, and removal of plant and other materials from the areas.

15.5 Future directions

15.5.1 Ensure that road construction causes minimum environmental damage

Roads should not be constructed through protected areas. In cases where it becomes necessary, all potential adverse impacts must be identified early in the road planning process and provisions made to avoid or minimise those effects, for example, by ensuring preservation and rehabilitation of critical habitat, establishing alternative habitat areas, and ensuring safe migration and movement for animals via crossings or underpasses (UN 1999).

15.5.2 Establish check points along access and egress routes

Check points should be established on access and egress routes from protected areas. Visitors should be required to stop at entry points and, if required have their vehicles inspected on exit. Check points should serve to prevent, among other things, the import of hazardous materials to sensitive ecological zones, uncontrolled livestock importation, and smuggling of poached animals and plant materials out of protected areas. Check points can be used to deliver brochures to travellers educating them about conservation. Also, they can provide rest areas with waste disposal facilities and toilets to discourage littering and indiscriminate stopping along the roadside.

16 Community development and protected areas

16.1 Current relationship

Today, people living in or near protected areas continue to use resources from these areas including cultivable land, timber, food, fodder, fibre and medicines. They frequently have few other options.

There are no definitive figures on the numbers of people living inside protected areas. They range from five million living inside all PA categories to more than 500.000 people estimated to be living inside just national parks and wildlife sanctuaries. The number of people living adjacent to protected areas and dependent on them either in the form of land and resource use or in the form of ecosystem services is much higher. In the 1980's, Ford Foundation research in Thailand suggested that 10-15 million people were living on forest areas totalling 205,246 square km (Ford Foundation 2000). In 1993, a national inventory conducted by RFD documented the activities of more than 12,000 rural communities groups protecting forest areas up to 40 square km for a variety of religious, ecological, and economic purposes (Poffenberger and Mcgean 1993). In 2001, RFD research found that 462,450 community groups were resident in a total forest area of 16,000 square km and actively engaged in their management (Makarabhirom 2002).

Government policy with respect to the local communities has traditionally emphasised enforcement of the laws forbidding residence and resource use in the PAs. In practice this has proved difficult to enforce and relocation of people has not been an option. Logistics for enforcing strict protection in over large areas have proved unrealistic. Conflicts between communities and PA authorities have been widespread. There is now an increasing recognition that collaborative approaches are required.

The National Parks Act of 1961 provides the basic legal framework for establishing and managing National Parks, and the Wildlife Protection Act (revised in 1992) for Wildlife Sanctuaries. The former allows and encourages visitors; the latter does not. Both Acts forbid residence as well as hunting, clearing, gathering of vegetation, mining and the introduction of livestock within PA boundaries. When PAs were established, the existence of large numbers of local communities living within their boundaries was not considered. However, Cabinet Resolution of 1998 has in principle provided some limited recognition of communities living within PAs before their gazettal.

The most direct and significant legal basis for stakeholder participation in PA management is found in the Constitution of Thailand (1997), which addresses public involvement in national and local affairs, and specifically in natural resource management.

Furthermore, the Decentralisation Act (1999) provides the legal framework for the revised functions and responsibilities of Local Government Authorities. The Act operates on the principle of devolving authority to the lowest appropriate level, as well as enhanced civic participation in local affairs. This includes decentralised responsibilities for environmental and natural resource management, infrastructure development and social welfare. In general, implementing regulations relevant for the sector do not support the existing legal framework.

16.2 Issues

16.2.1 Forest values for rural people

Dependence on a wide range of products collected from the forest has long been a way of life and supplements livelihoods in rural areas throughout Thailand. Forest foods are often particularly important for poorer groups (Mittelman et al. 1997). They provide an available and accessible source of a diverse range of foods and other livelihood products. For poor people in rural Thailand, household food security is not simply a matter of agricultural production. It depends upon a range of factors, which together affect access to an adequate year-round food supply. In many rural areas forests continue to play a vital role in ensuring food security. Especially important are fish, seasonally available fruit, leaves, nuts and mushrooms, and smaller wild animals. In some cases, the availability of forest foods may allow farmers to market a greater share of their agricultural produce permitting investment of agricultural profits back into the farm (Box 9).

Box 9: NTFP use among households in the Upper Nan Watershed and Doi Inthanon National Park, Chiang Mai

The management and consumption of non-timber forest products (NTFPs) in Thailand provides the principal focus of interaction between protected areas and local people. NTFPs contribute to sustaining rural livelihoods through subsistence and commercial uses. The table below lists a number of NTFP species extremely valuable to communities living in the Upper Nan watershed on the boundary of the Upper North with Lao PDR. The criterion for determining their level of importance was that, for each, more than 10,000 kg per year are commonly harvested.

Rank	Harvested	Consumed	Income
1	Bamboo Shoots	Bamboo Shoots	Sugar Palm
2	Sugar Palm	Grass Leaves	Broom Grass
3	Broom grass	Wild Vegetables	Jungle Spices
4	Grass Leaves	Mushroom	Bamboo Shoots
5	Wild Vegetables	Rattan	Wild Boar
6	Jungle Spices	Rats	Klar
7	Rattan	Jungle Spices	Grass Leaves
8	Mushrooms	Sugar Palm	Wild Vegetables

Most plants used by local communities resident in Doi Inthanon National Park are for food and medicinal purposes, and to a lesser extent, for fibre extraction, natural dyes and ritual uses. Each plant is associated with a specific management regime. Of 501 specimens of locally utilised plants, only 435 species could be scientifically identified. Some are used to obtain supplementary income through sale at the central market in Chiang Mai city.

Local people demonstrated significant knowledge regarding the ecological characteristics necessary for cultivating the various plant species in the forest, and in regard to their sustainable management. Of particular interest is the wide reaching knowledge regarding medicinal plant use.

Source: Jintana et al. 2001; Trisonthi and Trisonthi 2001

While forests provide a wide range of supplementary livelihood products for a large number of rural families, they also provide critical supports to local agricultural production. These include the protection of

water resources for irrigation, delivery of fertility in the form of detritus-laden water from streams and irrigation canals, as well as a balance in insect pest and predator populations. Each of these inputs can be ascribed an economic value in terms of their direct contributions to agricultural production, or conversely, savings on agricultural inputs that would otherwise be required in their absence. Thus, both directly and indirectly, protected forests have an impact on rural people's food and livelihood situation. Similar relationships exist for protected coastal and marine ecosystems.

16.2.2 The Community Forestry Bill

Communities throughout Thailand manage forests to varying degrees. A community forestry bill drafted collaboratively by the NGO community and RFD was sent for reading before Parliament. The draft stipulated that community forests could be located in protected areas, so long as the community can prove residency for a certain period of time and demonstrate capacity to manage the forest on a sustainable basis. However, there was a lack of consensus regarding whether community forestry should be permitted in protected areas (Makarabhirom 1998). There were concerns that permitting use of resources within protected areas would result in their further encroachment and unsustainable exploitation. The split, reflected by disparate decisions of the lower and upper houses of Parliament, regards the establishment of rights for local communities to be involved in protected area management. The bill is currently before Parliamentary committee.

16.3 Achievements

16.3.1 Community involvement in forest management to be given legal standing

Thailand stands on the threshold of significant reform to the ways in which rural communities are involved in natural resource management in areas adjacent to and within protected areas. The nature of the reforms will be determined by the final outcome of ongoing discussions regarding the wording of the Community Forestry Law. The Law should also establish a set of principles and guidelines equally applicable to sustainable management by local communities of coastal and marine resource systems.

16.3.2 Demonstration and pilot projects for joint management of protected areas and forests

A range of ongoing activities has demonstrated that the participation of local communities in the management of natural resources can both assist efforts to conserve protected areas and promote rural development (RECOFTC 2000).

In the 1980's, the Ford Foundation began to support a range of projects by the RFD, local communities, NGOs and academia aimed at documenting examples of effective community involvement in forest management, and developing innovative approaches at project sites throughout the country. Since then, many buffer zone and natural resource management projects have emphasised collaborative management approaches with local communities.

A key initiative of government is the Six Pilot Parks Project (2001-2006) launched by the RFD in 2001, as a result of a direct request from the Prime Minister to address issues of peoples' participation in National Park management. The project seeks to address conflicts between communities and National Parks, by helping to implement government policies on enhanced peoples participation in natural resource management, seeking to create forums for collaboration, supporting communities in parks and promoting conservation. A special budget of US$1 million was allocated to the project for the fiscal year 2001-2002 to support an information campaign to promote the concept in the media, an external consultancy to develop guidelines for implementation of the project at site level, and pilot site activities at local level. The Danish government has agreed to provide additional support to the project with a view to extending joint management approaches to 11 protected areas.

16.4 Challenges

16.4.1 Conservation of biological diversity

Forest conservation has proven difficult in Thailand and a large area of what was once forest has been replaced by degraded vegetation or other uses, primarily, agricultural cultivation. There is significant and justified concern that where forests and other protected area resources are delegated to community management, external forces could intervene to exploit these newly available resources to their own benefit. Assiduous monitoring would be required, in line with sanctions accepted by all parties and which uphold biodiversity conservation as the primary purpose of protected areas.

16.4.2 Communities living within protected areas

There is still no legal framework acknowledging the right of communities to live within protected areas. Recent alterations to the Community Forestry Bill passed by the lower house of Parliament rescind permission for communities to reside within or to use resources from protected areas. This situation makes it difficult to achieve systematic advances in managing protected areas so that local communities uphold and help implement biodiversity conservation measures. For example, the establishment of PA management committees, preparation of effective management plans, and monitoring and enforcement all become difficult where the rights of use and access of local communities are not clarified.

16.5 Future directions

16.5.1 Monitored agreements for community-based resource management

Community resource management zones and specified resources should be identified within protected areas and their buffers to be managed jointly with PA authorities based on specific agreements forged collaboratively among the primary stakeholders. The agreements should become part of the overall management plans for the PA. They should allow for agreed changes based on lessons learned from experience, but should have strong sanctions when breaches occur. Most important, communities should be closely involved in their monitoring and enforcement.

16.5.2 New skills required among forestry and natural resource management professionals

Many foresters continue to consider the consultation and collaboration with rural people on forest management issues to be beyond the bounds of their profession. The future establishment of community resource management arrangements will involve more intensive working relations between natural resource management professionals and local people. The skills required for facilitating dialogue, mediation and negotiation are not yet a consistent part of natural resource and environmental management training curricula. Responsible officials require on-the-job training and relevant university faculties should be assisted in upgrading and implementing curricula to include courses and skills in facilitating community resource management.

Part 5: Protected areas as a development strategy

17 Economic development and protected areas

Protected areas are at the heart of Thailand's conservation strategy. Gradually they are also becoming recognised as a key force in the nation's development. Conservation has been viewed as a means of preserving species and habitats. A more robust understanding is now evolving. Protected areas deliver vital environmental goods and services that support a range of economic development sectors. These goods and services are key to preserving both the quality of life of the population, and the revenue generating potential of the economy. Sustainable revenue generation is linked to a country's success in maintaining the integrity of its natural systems. Protected areas are a critical element in the overall national environmental management strategy and could be considered as "engines" for development. This final part of the national report examines some key strategic options for Thailand in achieving its interrelated conservation and development objectives through protected areas.

17.1 Institutional Strategies

The new Constitution of Thailand promulgated in 1997, popularly called 'the People's Charter' lays particular emphasis on decentralisation of governance through devolution of natural resource management with people's participation. In particular, Article 79 of the Constitution states: "The State must promote and support the role of the people in conserving, maintaining and utilising the natural resources". Among other things, this will involve institutional reorganisation, structural adjustments and management adaptations (Bhadhrajaya 2001).

Devolve protected area management authority

Thailand's sweeping government decentralisation is poised to reassign personnel to regions, provinces and districts. Here, their experience and capacity will be applied to assist in achieving local development and conservation objectives. While national guidelines should continue to provide a framework for decision-making much of the daily management responsibility is being devolved to localities. In the case of protected areas, the former regional forest offices, provinces and protected area authorities are to be given expanded roles and greater autonomy. Already the former regional forest offices are taking on coordinating and directive roles for the protected areas within their region. The role of the regional office is important in providing key services such as GIS and ecosystem planning across wider landscapes. But care is needed to avoid creating another layer of administration and taking away local initiative and management authority at the individual PA level. Each PA must have a management committee, which has direct authority to prepare and implement a management plan with concerned stakeholders.

Develop capacity to support devolution of PA management authority

For devolution of PA management authority to be feasible and effective, the capacities need to be built in each locality. This will require additional in-service training for PA authorities, as well as for the members of NGOs and local communities who should be included on PA management committees.

17.2 Policy framework

Undertake a national protected areas systems plan

There is a growing need for a national PA system plan in Thailand to provide a coherent and long-term vision for PA design, establishment and management (IUCN 2002). The plan would need to link PAs to the main sectors and to local communities in terms of the development benefits they provide and the conservation requirements to safeguard those benefits. Four main factors justify the preparation of a system plan:

1. There is a growing need for enhanced institutional coordination in PA management, as well as partnerships between government agencies and civil society in PA maintenance.
2. The existing PA system is not able to capitalise on the full range of management options and models offered in IUCN's system of PA categories.
3. The policy and legal framework is no longer up-to-date and does not adequately reflect current field realities and the needs of PA managers.
4. Key ecosystems remain under-represented in the national PA system and critical habitats remain unprotected.

The plan would seek to enhance the contribution of PAs to national development and community livelihoods while better conserving biodiversity. It would promote a bioregional approach integrating PAs within the wider development landscape and it would facilitate the integration of PAs with other development planning strategies such as those for tourism, agriculture, fisheries and energy.

Prepare a comprehensive protected areas law

The legislation regulating protected area establishment and management dates from the 1960's. Many of its provisions no longer reflect current conditions or more recent developments in PA management approaches especially the spirit of the new constitution. There is a lack of clarity concerning the functions of different PA categories, considerable overlap with other legislation, and with respect to marine areas, and a plethora of separate laws governing the use of land and water resources within PAs.

Introduce a user pays approach to maintaining protected area services and products

Users of PA services and products generally receive these free or at little cost. Also, revenues collected in the form of taxes or fees do not go to maintain or conserve the benefits. A user pays approach is essential to integrating protected areas within the economic planning and budgeting process. In this way PAs will be recognised as productive components of the economy.

Examples can be found in all natural resource based sectors. Surcharges on hydroelectricity should be used to manage and rehabilitate watershed areas and invest in alternative energy research such as wind and wave power. Water user fees are extremely contentious but necessary whether they relate to downstream industries, urban areas or irrigation schemes. To increase their feasibility, small farmers and the poor should be exempted from paying them. Fisheries benefit from up and downstream protected areas. Equitable economic instruments are needed to ensure that the sector pays for those services. Tourism is a special case where a wide range of instruments needs to be applied to properly reflect the value of benefits received and their conservation needs.

17.3 Integrated multi-sectoral planning approaches

Expand the ecosystem based management approach to all forest and marine complexes

Biological diversity needs to be managed on a regional basis, using natural boundaries to facilitate integration of conservation and production-orientated management. This is the overall goal of Thailand's 19 forest and marine complexes. The Western Forest Complex has been the focus of land use planning and ecological zoning using rapid assessment and participatory approaches. Ecological management zones have been prepared and are now being applied to the 17 PAs within the region. A similar process needs to be followed for each complex leading to complex wide or bioregional plans.

Develop networks of corridors to expand protected habitats

Thailand's ecosystem complexes envision a protected area system in which existing protected habitats are substantially augmented by connecting a number of sites in the same geographic region. These sites are presently interspersed by various human uses, some of which are longer standing and more intensive than others. Government needs to work with land owners and users to define strategies for regimes of protection across each complex so that productivity increases and conservation improves. This should be undertaken as part of the bioregional planning process.

In some cases of critical habitat or environmentally sensitive area, it may be desirable for government, with the assistance of conservation trust funds established for the purpose, to purchase areas to create habitat connections between currently separated protected areas. Terrestrial corridors may require reforestation with native species. In some cases, facilities for the safe migration of wildlife would also be necessary.

Zone protected areas for a gradation of sustainable uses and conservation

Protected areas in Thailand have long been used for a range of extractive or aesthetic purposes while continuing to maintain their value by providing environmental services and habitats for conserving biological diversity. Many protected areas have also been damaged by extractive uses, and no longer provide the optimal level of ecological services for which they are otherwise equipped (for example, watershed protection). To improve the ability of PAs to continue delivering a range of conservation and economic benefits, protected areas should be zoned for multiple sustainable use and conservation. Zoning decisions should reflect state-of-the-art biological conservation and rehabilitation principles, as well as the needs of various user communities, to the extent that this is feasible. Planning will require that representatives of the various user and stakeholder communities be substantively involved in geographically designating the various zones, in defining their boundaries on the ground and in ensuring that agreed management controls for each zone are monitored and enforced.

Derive and apply lessons from Thailand's River Basin Management Initiative and Western Complex to develop multi-stakeholder approaches

The planning model developed by the Ministry of Interior under its pilot environment and development planning initiative, and the elaboration of these efforts in MOSTE's Integrated River Basin Management initiative, offer important insights regarding how to engage diverse stakeholders and line agencies in collaborative planning for integrated conservation and development. So too does the Western Complex project which led to the establishment of influential Provincial Conservation Forums. Lessons gained from these initiatives should be distilled and applied to develop a multi-stakeholder planning approach to all forest and marine complexes. Collaborative stakeholder planning aims to mediate and pre-empt potential conflicts of interest before they occur. Plans are designed to optimise development benefits so that benefits received by one stakeholder do not preclude benefits for other legitimate stakeholders. Collaborative conservation and development planning also determines how each of the stakeholders will assume specific responsibilities associated with collaborative management arrangements.

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Abbreviations and Acronyms

ADB	Asian Development Bank
ALRO	Agricultural Land Reform Office
ARCBC	ASEAN Regional Centre for Biodiversity Conservation
CBD	Convention on Biological Diversity
CFB	Community Forestry Bill
DANIDA	Danish International Development Assistance
DMC	Department of Marine and Coastal Resources
DNWP	Department of National Parks, Wildlife and Plant Conservation
DoA	Department of Agriculture
DOLA	Department of Local Administration
EGAT	Electricity Generating Authority of Thailand
EIA	Environmental Impact Assessment
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
GDP	Gross Domestic Product
ICDP	Integrated Conservation and Development Project
ICLARM	International Centre for Living Aquatic Resources Management
ICEM	International Centre for Environmental Management
IMF	International Monetary Fund
IUCN	The World Conservation Union
JICA	Japan International Cooperation Agency
KwH	Kilowatt Hour
Lao PDR	Lao People's Democratic Republic
LGDAD	Local Government Development Affairs Division
MAB	UNESCO Man and the Biosphere Program
MOAC	Ministry of Agriculture and Cooperatives
MOI	Ministry of Interior
MONRE	Ministry of Natural Resources and Environment
MOSTE	Ministry of Science, Technology and Environment
MRC	Mekong River Commission
NAREBI	National Resources and Biodiversity Institute
NBSAP	National Biodiversity Strategy and Action Plan
NCCBD	National Committee on Conservation of Biodiversity
NEB	National Environment Board
NEPO	National Energy Policy Office
NESDB	National Economic and Social Development Board
NESDP	National Economic and Social Development Plan
NGO	Non-governmental organisation
NRCB	Natural Resources Conservation Bureau
NRDP	National Rural Development Program
NTFP	Non-timber forest product
OEPP	Office of Environmental Policy and Planning
PA	Protected area
PAD Review	Review of protected areas and development in the four countries of the lower Mekong River region
PAD	Protected Areas and Development
RECOFTC	Regional Community Forestry Training Centre

RFD	Royal Forest Department
RTG	Royal Thai Government
t	Tons
TAO	Tambon Administrative Organisation
TAT	Tourism Authority of Thailand
TDRI	Thailand Development Research Institute
UN	United Nations
UNDP	United Nations Development Programme
WCMC	World Conservation Monitoring Centre
WRI	World Resources Institute
WWF	World Wide Fund for Nature

The Review of Protected Areas and Development (PAD Review) examines the growing tensions between economic and conservation objectives in the four countries of the lower Mekong River region: Cambodia, Lao PDR, Thailand and Vietnam. It identifies the many development benefits flowing from protected areas and the need to reflect them in the plans and budgets of forestry, agriculture, energy, tourism, fisheries and other key economic sectors. The lessons of more than a decade of protected area management experience in the region are related to new and innovative approaches elsewhere in the world.

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