Chapter 10. Thailand

CHAPTER 10

Thailand

Surin Vivajsirin, Piyathip Eawpanich and Andrew Mittelman

SUMMARY

Thailand is not a party to the Convention on Biological Diversity; concerns remain about its legal implications for national sovereignty. Since signing the Convention at the Earth Summit in 1992, however, the country has made significant progress in implementing its provisions. The Office of Environmental Policy and Planning (OEPP), within the Ministry of Science, Technology and Environment (MOSTE), and other biodiversity related institutions have adjusted existing programs and initiated additional projects to be in line with the Convention's objectives.

Activities range from formulation of national policies, strategies and action plans and supporting research and training, to enhancement of information systems. The National Biodiversity Strategy and Action Plan (NBSAP), 1998–2002, was formulated in part to recognise Article 6 of the CBD but also because of the need for a national strategic framework for the conservation and management of natural resources. Cabinet approved the NBSAP as a national policy on 15 July 1997. The NBSAP contains 446 projects amounting to over US$140 million, to be implemented principally through domestic resources by 67 agencies. Unfortunately, when the economic crisis hit Thailand in late 1997, the national budget was cut and revised, which had a strong impact on NBSAP implementation. Nevertheless, most of the relevant agencies included some of the NBSAP projects in their annual budget plan. None of the NBSAP objectives have been fully achieved over the last four years, but it remains a credible and solid framework of policy, priorities and programs for biodiversity conservation in Thailand.

Introduction

Thailand is centrally located within mainland Southeast Asia. To the north, at 20 degrees north latitude, the kingdom borders Myanmar and Lao PDR. Northern Thailand is primarily mountainous with several large valleys. The adjacent fertile central plains are formed by floodwaters from the Nan, Yom, Ping and Wang Rivers, which flow from the north to form the Chao Phraya River basin. Thailand's expansive northeast is mostly high plateau bordering Lao PDR and Cambodia. There, soils are less fertile, and most of the region receives considerably less rainfall than other parts of country, making it, overall, the economically poorest region. In the west, where most of the country's remaining forest area is located, Thailand shares a long land border with Myanmar. Many of the forest areas in Thailand's western region are contiguous to forests in Burma. This, the Western Forest Complex, is the largest remaining expanse of forest in mainland Southeast Asia. To the south, at 4 degrees north latitude, the nation borders Malaysia. With the Andaman Sea to the west and the Gulf of Thailand to the east, the southern part of the country has a longer rainy season and is more productive. The north–south span — 16 degrees of latitude and 1,860 km — gives Thailand one of Southeast Asia's most diverse climates. The Gulf of Thailand to the east and the Andaman Sea to the west form a combined coastline of 2710 km, with numerous small islands.

Although Thailand has not ratified the Convention on Biodiversity, it has been the intent of government to do so for some time. Cabinet approved its ratification on 15 July 1997 and confirmed this position on 28 October 1997, but objections from NGOs delayed the process. Accommodating the different perspectives on the CBD's implications for national sovereignty was put to the National Constitutional Court, which decided in late 2000 that ratification must be an act of Parliament. This has cleared the way for the process to go forward.

Initially a number of NGOs and academics in Thailand objected to the country's becoming a party to the CBD. These objections related primarily to access by signatory countries to Thailand's biodiversity resources and related intellectual property. The case of a Japanese company that patented a Thai traditional herb and sold it for ten times the price at which it was previously available is a frequently cited example. The concern was that the Convention might promote and facilitate such access. On the other hand, commercial interests already have access to Thai biodiversity products and indigenous knowledge, and Thailand, not being a party, does not benefit from contributing to the evolving framework of controls being developed through the convention process.

There was also concern that Thailand's laws would not ensure effective CBD implementation. After the *Traditional Medicine Act* and *Plant Intellectual Property Act* were passed in 1998, this legal impediment no longer existed. Another critical law for CBD implementation, the Community Forest Bill, has not been enacted, although the draft is before Parliament for final consideration.

Thailand's Constitution now allows local communities to assume a much more substantive role in managing their local natural resources. Involving local communities provides a great potential for improving conservation and rehabilitation of biodiversity and habitats within and outside protected areas. Developing ways to effectively involve rural communities in managing the country's natural resource systems is the subject of spirited discussion, and will likely become increasingly significant in the context of Thailand's biodiversity conservation efforts in coming decades.

The government had implemented many activities related to biodiversity conservation and sustainable use for years prior to formulation of the CBD. Examples include the establishment of an extensive network of protected areas since the 1960s, the establishment of the National Rice Seed Storage Laboratory in 1980, establishment of the National Gene Bank in 1985, and establishment of the Thai Environmental Fund in 1992. The government has not waited for the ratification issue to be resolved but has gone ahead with implementing the convention within the limits of its resources. The 1997 economic crisis reduced investments in this field more than other sectors. Despite that setback, other key activities related to CBD implementation have progressed:

- the National Committee on the CBD in 1993;
- the Biodiversity Research and Training Program (BRT) within MOSTE in 1996;
- the Natural Resources and Biodiversity Institution (NAREBI) within the Ministry of Agriculture and Cooperatives (MOAC) in 1998;
- formulation of the NBSAP after 1995; and
- drafting of the regulation on access to biological resources in 1993.

International support to assist in CBD implementation in Thailand has come from UNEP, DANCED, JICA, CIDA, IPGRI and UNDP. In 1995, for example, UNEP supported the Office of Environmental Policy and Planning (OEPP) in summarising the Thailand National Biodiversity Report and in initiating the Thailand Biodiversity Data Management (BDM) project (1995-98) which had technical

backing from the World Conservation Monitoring Centre. Also, DANCED supported OEPP to conduct the National Inventory of Natural Wetlands (1995–1998) and assisted RFD in establishing the Forest Genetic Resources Conservation Management Program (1997-2000).

Biodiversity status and trends

With a north-south axis that extends 1800 km from mainland to peninsular Southeast Asia, Thailand provides a wide range of habitats supporting a diverse flora and fauna. The northern half of the country is associated with the Indochina bio-geographical realm, while southern habitats support species typical of the Indo-Malayan realm. More than 12,000 plant species have been identified. Indigenous mammals, mostly found in dwindling numbers within Thailand's national parks and wildlife sanctuaries, include tiger, leopards, elephants, Asiatic black bears, Malayan sunbears, gaur (Indian bison), banteng (wild cattle), serow (Asiatic goat-antelope), tapir, pangolin, gibbons, macaques, sambar deer, barking deer, mouse deer, dolphins and dugongs (sea cow).

Of Thailand's 300 mammal species, including clouded leopards, Malayan tapir, tiger, Irawaddy dolphin, goral, jungle cat, dusty langur and pileated gibbon, 40 are listed in IUCN's Red Book of globally endangered species. Thailand is rich in bird life, with 962 recorded resident and migrating species, approximately 10 per cent of the world's avifauna. Herpetofauna in Thailand number around 318 reptiles and 123 amphibians. They include the giant black jungle monitor and four giant sea-turtle species, along with numerous snakes of which six are venomous and the largest — the python — reaches a length of 15 m. Insects number some 6000 named species. The country's rich marine environment contains tens of thousands of other species. Some 1,000 species are endemic to Thailand.

The principal threat to Thailand's biodiversity is the rapid demise of various critical habitat types. Habitat degradation and depletion has occurred primarily as a result of rapid economic development (e.g. road and dam construction) associated with population growth and expansion of urban, industry and tourism development. Logging and forest fires cause destruction, although widespread conversion of forest to agricultural land use and expanding community settlements are even more serious problems. This is because forests are permanently converted beyond any possible rehabilitation or recovery, and agricultural activities cause water, soil and pollution problems in the surrounding areas.

In 1999, according to the Royal Forest Department (RFD), Thailand's forest estate comprised about 25.28 percent of land cover. This represents a 50 percent decrease since 1960. Other researchers suggest that intact forest cover in Thailand now amounts to only 18 percent of total land area (517,000 sq. km) or 93,000 sq. km. As a result of ongoing encroachment, illegal logging and forest fires, this percentage continues to diminish. Similar trends can be cited for coastal mangroves and both freshwater and brackish coastal wetlands. Specialists are concerned that the declining size of the remaining intact habitat fragments threatens the survival of important species, including Asian elephants and Siamese tigers.

In 1996, six vertebrate species became extinct in Thailand: Schomburgk's deer *(Cervus schomburgki)*, Giant ibis *(Pseudibis gigantea)*, Large grass warbler *(Graminicola bengalensis)*, Silver shark *(Balantiocheilus melanopterus)*, Siamese flat-barbelled catfish *(Platytropius siamensis)* and Siamese tiger fish *(Coius microlepis)*. In addition, seven species are likely to be extinct in the wild, including the Lesser one-horned rhinoceros *(Rhinoceros sondaicus)*, Eld's brow-antlered deer *(Cervus eldii)*, Kouprey *(Bos sauveli)* and Sarus crane *(Grus antigone)*. Decline in the number of individuals among a host of other species means that their intra-species genetic diversity may already have been eroded beyond the point at which the populations remain viable.

Coastal areas

Coastal and inland waterways of the southern peninsula are especially important habitats for Southeast Asian waterfowl. Loss of mangrove forests due to extensive conversion to prawn farms, resort development and charcoal production is posing a significant threat to Thailand's aquatic avifauna. Waterfowl are increasingly being deprived of vital intertidal food sources. Harvest of swiftlet nests in the south for bird's nest soup has been monopolised by a few companies, and no scientific studies of the bird's life cycle and status have been carried out. The use of push nets and bottom trawl nets within the coastal protected zones, three km from the shoreline, has resulted in severe depletion of fish stocks as well as the destruction of other marine species and habitats. The combined destruction of rich coral feeding grounds and natural breeding and hatchery areas in coastal swamps and wetlands has reduced the productivity of Thailand's fisheries.

Tens of thousands of artisanal fishing families whose life depend on freshwater and marine fisheries have been adversely affected by the decline in fish stocks, as have farmers living adjacent to Thailand's diminishing forests who are dependent on a declining supply of supplementary subsistence products

and ecological services. These trends, largely a result of poorly controlled and inappropriate commercial exploitation of natural resources during the past several decades, have led to a nationwide movement among rural people demanding the rights to manage their local natural resource systems. These rights have now been enshrined in Thailand's Constitution (1997). How this will actually be implemented is still unclear, but it appears likely that rural communities will be afforded considerably greater rights and responsibilities with respect to the management of Thailand's natural resources, and the sustainable use and conservation of its biodiversity.

Current practice in biodiversity conservation

In situ conservation

Thailand has set aside 18 per cent of its land area — a total of 87,696 sq. km — to be managed as protected areas. In 2000 this national system consisted of 75 national parks, 21 marine national parks, 48 wildlife sanctuaries, 67 forest parks and 55 wildlife non-hunting areas. Another 57 sites have been proposed as new protected areas, covering a further 24,610 sq. km. The Ministry of Agriculture and Cooperatives (MOAC), through the RFD, is responsible for managing this land.

A number of areas outside the system provide important habitat for endangered and rare species. Under the 1992 *Enhancement and Conservation of National Environmental Quality Act*, the government may declare an Environmental Protected Area to conserve a unique habitat in certain situations. This was the case with Dun Lumpan forest, covering 0.5 sq. km in Maha Sarakam province, which was declared to protect a rare crab endemic to the area. The *Act*, however, is only a mechanism for area declaration and for OEPP to obtain support from the Thai Environmental Fund to formulate a management plans. It does not provide legislation to manage areas. The effectiveness of Environmental Protected Areas in the conservation of biodiversity resources is therefore less than that of protected areas declared under the forest acts.

In 1990, the RFD undertook a comprehensive study on the conservation and development of forest land. This led to a project proposal to the Global Environment Facility (GEF) through the World Bank to build institutional capacity for biodiversity management in protected areas and buffer zones. The project was not approved because Thailand is not yet a party to the CBD.

Thailand has long conducted reforestation and rehabilitation projects in degraded areas throughout the country. The rate of reforestation has never

kept pace with forest loss, managing to restore only around three per cent of deforested areas annually. In 1992, the government initiated an intensive campaign to rehabilitate degraded forests. To commemorate the 50th anniversary of the King's accession to the throne, the government set a target of 40 per cent forest cover for Thailand and embarked on massive replanting programs. This project was executed by RFD to encourage the private sector, educational institutions, other government agencies, NGOs and communities to take responsible for rehabilitation of particular areas of degraded forest over five years. Even though the project has not reached its target, it has generated public awareness, and support for forest conservation and rehabilitation has dramatically increased. The RFD continues to promote participation of local communities in forest rehabilitation, including the establishment of local volunteer groups for forest protection, and training of teachers and local officials in conservation methods.

The department has drafted a *Community Forest Act* in consultation with environmental NGOs. Several drafts of this legislation have languished in Parliament for a decade due to strong differences of opinion both within the NGO community, and between NGOs and government. The Bill is currently before parliament and is expected to be passed into law by the current administration. The *Community Forestry Act* will empower communities to manage local natural resources, as required under articles in the country's Constitution (revised in 1997). Each community — through its members, leaders and village committees, with support from subdistrict councils — is encouraged to submit their project to proclaim forest lands within their areas as community forests. In the proposals, the community must identify management criteria, showing how they intend to conserve and manage the use of their forest. Central government through RFD will assist in facilitating and providing technical support as needed.

Ex-situ conservation

Ex-situ conservation of biodiversity is implemented in Thailand through several groups: government, educational institutions and the private sector. MOAC is responsible for forest, fisheries, livestock and agriculture products and is the key agency for ex-situ conservation. The Department of Agriculture issued its 1992 regulation on collection and conservation of plants, including gene banks. Management of the Rice Seed Storage Laboratory and the network of rice research station is one of its major duties, as rice is one of Thailand's most important agriculture products. The Department of Fisheries (DOF) collects and breeds both freshwater and marine fish species. DOF's freshwater fish museum is located in Bangkok and its marine aquarium is in Phuket.

Under the administration of RFD, forest plant species are collected and preserved through the National Herbarium in Bangkok, eight botanical gardens and more than 50 aboretums throughout the country.

Three organizations are directly involved in ex-situ conservation under the Office of the Prime Minister:

- the Office of the Royal Development Projects Board integrates expertise, budgets and staff from relevant agencies to form multi-disciplinary teams that serve royal initiatives and projects. The Conservation of Plant Genetic Resources Project at Koh Ta Chai and Koh Born in Phang Nga Province, the Khao Hin Shon Herb Research and Development Project in Cha Cheng Sao Province, and the Pru Toh Daeng Peat Forest Research and Development Project in Nara Thiwas are examples.
- the Zoological Park Organization under The Royal Patronage of H.M. The King operates five zoos in various parts of the country. Dusit Zoo, the oldest, is in Bangkok; others are located in Chaing Mai, Nakorn Rajasima, Chonburi and Song Khla.
- the Botanical Garden Organization under the Royal Patronage of H.M. The Queen, established in 1995, is located in Chaing Mai along with the Sirikit Botanical Garden. The establishment of these organisations and projects illustrates the strong commitment of the Thai government to conserve biodiversity resources before the economic crisis hit in 1997.

Several universities also do important work in ex-situ conservation of biodiversity. The Marine Science Faculty of Burapa University operates its marine aquarium for public education in Chonburi, and the Faculty of Pharmacy of Mahidol University has collected Thai medicinal plants within its Siri Arboretum in Nakorn Pathom Province.

The crocodile farm in Samuth Prakarn is a private sector initiative which has contributed to ex-situ conservation of crocodile species in Thailand for more than 50 years. Individual Thai farmers also have a significant role in ex-situ conservation; an example is the fighting cock, which is preserved and bred in all its varieties by local farmers.

Sustainable use

Legally, the concept of sustainable use has been recognized and regulated by the *National Reserved Forests Act* of 1964 (amended 1985) and the *Fisheries Act* 1947. The *National Reserved Forests Act* identifies logging and collection of forest products (Chapter II, section 15) as requiring special permits, along with the temporary occupation of degraded forest land (section 16) and

research and education activities (section 17). In the *Fisheries Act* several sections state the obligations for sustainable fishing. Section 7, for example, authorises governors to declare "Water Plant Protected areas" and Section 32 prohibits fishing of certain species (for example, dugong at breeding time) and the use of inappropriate gear (for example, electricity, trawling and push nets within three km of shore).

The laws are not effective in promoting and managing sustainable use and have led to an inequitable division of benefits between investors and local people. In fisheries and forestry inadequate staff and budgets, the complexity of monitoring the use of resources and, most important, an unwillingness to enforce the law all undermine the existing legal framework.

Permits for most activities regarded as exceptions under the *National Reserved Forest Act* are issued to those who know the law, normally government organizations and commercial operators, not to local people. Local people recognise that it is usually government projects and organisations which have concessions to make use of forest land, including logging and industrial plantations for teak, rubber and eucalyptus. After more than 20 years of this system there is a general sense that the concept of sustainable use has been neglected in Thailand.

Past governments have favoured dramatic actions, such as the 1989 ban on logging in natural forests, over more moderate mitigating measures. In practice, however, efforts to enforce these measures have proven largely ineffective. Forests continued to diminish despite the logging ban. Efforts to enforce authoritarian restrictions on forest use have provoked significant and sometimes violent social backlash. In 1992, the RFD, with military assistance, attempted to evict millions of people from National Forest Reserve lands which residents had been cultivating long before their gazetting as part of the National Forest estate.

One encouraging development is the advent of the many small-scale integrated conservation and development projects being implemented at community level throughout the kingdom with NGO assistance. Government has not yet taken significant note of these, although efforts to consolidate lessons learned and promote innovative sustainable resource management and conservation approaches have been enthusiastically taken up by the NGO community and by a growing number of civil society activist and academic institutions. These activities have been encouraged by the passage of Thailand's new constitution which calls specifically for the involvement of local communities in the sustainable management of local natural resource systems.

Box 1. Sustainable use initiatives

There are several outstanding examples of pilot sustainable use initiatives. Many of them operate with support from NGOs and the Royal Project Foundation under the supervision of the Thai Royal Family with support from RFD. The Doi Sam Muen Project in Chiang Mai involved an innovative alliance among local communities, sustainable resource management scholar-practitioners from Chiang Mai University, and the Northern Watershed Development Subdivision of the RFD. Farmers were provided land tenure and development assistance in return for their collaboration on design and implementation of sustainable use and conservation agreements. The Royal Project Foundation's Sirikit Forest Park Project in Song Khla and Satun Provinces aims to establish sustainable livelihoods in local communities dependent on forest products. Another Royal initiative, the Princess Chulabhorn marine park project implemented by the Royal Navy, RFD and other agencies, promotes local community involvement in conservation of natural resources and sustainable tourism within a marine park.

Since 1992, the Department of Fisheries has conducted a coastal fishery development project to help local people develop sustainable fishing methods and reduce conflicts between small-scale artisanal fishers and commercial fishing fleets. The vast number of agencies with responsibility for coastal and marine management, combined with the ability of strong vested interests to avoid prosecution for illegal fishing, prawn farm and resort development in Mangrove Forest Reserves has tended to confound the implementation of sustainable coastal and fisheries management programs, however. A notable exception is in southern Pattani Province where a small-scale traditional Muslim fishers' association has had their recommendations for sustainable fisheries management adopted into provincial policy and successfully enforced with their direct involvement. A recent effort to extend similar arrangements to other southern provinces has been postponed, apparently due to objections from large-scale commercial fishing interests which often involve local politicians.

Although there appears to be potential to achieve both local economic development and protected area conservation objectives, sustainable resource use approaches have yet to be widely applied in Thailand. Given new constitutional mandates, however, it is likely that new initiatives applying innovative, integrated participatory conservation and development approaches will be expanded in future. A daunting obstacle to this is the withdrawal of most

bilateral environment and development assistance from Thailand based on the kingdom's advanced economic development status compared to other South-east Asian neighbours.

Preparation of the NBSAP

In 1993, a year after Thailand signed the CBD, the National Environmental Board (NEB) appointed a National Sub-Committee on the convention, including distinguished local experts and representatives from relevant governmental agencies and selected NGOs. The committee is chaired by the Permanent Secretary of the Ministry of Agriculture and Cooperatives and coordinated by the Office of Environmental Policy and Planning (OEPP) under the Ministry of Science, Technology and Environment. OEPP is the coordinating agency for ratification and implementation of the convention.

The committee's first task was to establish a working group to draft a national strategy on biodiversity. The working group drew from the extensive research undertaken for the 1995 biodiversity status report. The report gathered information on the plants and animals of the country, its genetic resources and ecosystems, much of which was previously unpublished. The report also reviewed conservation activities that had been undertaken to that time and assessed the capacity of institutions and human resources.

The Biodiversity Data Management Project further analysed institutional capacity to manage 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 fed into NBSAP formulation.

OEPP had requested all relevant agencies, mainly the departments under MOAC, to submit projects. This helped create awareness of the importance of the CBD on the part of government agencies. Numerous 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 for review to a panel of over 100 experts from both governmental agencies and private organizations. The recommendations from the panel were integrated into a second draft NBSAP, which was submitted to the National Committee, the National Environment Board and, finally, the Cabinet for approval. In July 1997, the NBSAP was approved by Cabinet as national policy for a five-year period (1998 to 2002).

NBSAP principles

The overall aim of the NBSAP is "to ensure that biodiversity activities do meet national interests as well as to prioritize actions required for achieving the objectives of the Convention". This is to be achieved 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 between responsible agencies, conservation groups and 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; and
- ensure that activities for the conservation and sustainable use of biodiversity resources are consistent with national and international law.

While not made explicit in the principles, the NBSAP works with the budgets and resources of those sector agencies with responsibilities that affect the use of biodiversity resources. The NBSAP looks first at what can be achieved by making modifications to existing programs and approaches. 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 improving initiatives that already have staff and budgets. (It is important to note, however, that undertaking inter-departmental initiatives within the Thai government has proven extremely challenging for the Thai bureaucracy. A March 2001 Prime Ministerial directive instructed government departments with similar responsibilities to cease their traditional competitiveness and begin to actively exploring ways to work cooperatively.) Also, it is necessary to be realistic about the prospects for additional funding given the scarce resources and economic constraints. There is little chance of receiving substantial increases in re-

sources from government. And, given the GEF precondition of CBD ratification, it will not be possible to obtain funds from this important source.

NBSAP implementation priorities

The 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 time frame for implementation. Activities marked for implementation at a later stage are those which logically follow the completion of prerequisite initiatives.

Box 2. NBSAP strategies

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 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.**
7. **Promote cooperation between international and national institutions in the conservation and sustainable use of biodiversity.**

Strengthening institutional capacity was identified as the most important priority. There are 14 Acts, two cabinet decisions, five national plans and policies (including the NBSAP) and two departmental regulations related to the conservation of biodiversity. Limited achievement in conserving biodiversity is not, therefore, due to inadequate legislation, but rather to a lack of efficient and proper capacity to enforce and implement provisions of the existing laws and regulations. Without improving skills and capacities it would be difficult to achieve the goals set out in the remaining strategies.

With some of the most important biodiversity resources now located in protected areas, sound management of this national estate was considered the

next most important strategy. Four objectives under this strategy include extending the national systems to adequately cover rare and endangered species and ecosystems; emphasising sustainable use of resources in and around protected areas; enhancing skills and management capacity; and strengthening laws and resources.

Other priority strategies emphasize the increasing role and 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. Although they were not considered critical in the early stage of implementation, they are nevertheless important long-term components of the NBSAP and will receive increasing attention as progress is made in implementing higher priority strategies.

Biodiversity research and training

Research and training is a theme in most of the seven strategies of the NBSAP. In the past, there has been little coordination or sharing of information between agencies concerned with natural science research and training or guidance on establishing the priority of various biodiversity issues. A number of attempts were made to introduce a systematic national approach. In 1989, the Science Society of Thailand convened a conference on the study and value of biodiversity which produced recommendations on priorities for human and institutional resources for effective research. The initiative did not lead to new policies or institutional arrangements, however.

In 1996, the Thailand Research Fund extended its biodiversity activities through a special program on research and training on biodiversity in cooperation with the National Centre for Genetic Engineering and Biotechnology. The Biodiversity Research and Training Program (BRT) has assisted the development of biological research skills and worked with researchers, university students, NGOs, teachers, students and others to raise awareness among Thais of biodiversity and the need to cooperate in its conservation, rather than depleting it for short-term personal gain.

In 1999, BRT supported 36 biodiversity research projects, large and small. The program also assisted 64 students in Masters and doctoral thesis projects, and 21 short training courses. The total budget was 32.4 M baht (approximately $US0.85 million). The study of species and genetic diversity holds greater attraction for researchers and students than does habitat diversity, which

lacked research grant proposals. This suggests that Thailand still lacks expertise in ecological and natural systems research, a shortcoming in all regions of the country. BRT actively encourages biologists to conduct research in these areas, and organized a seminar to determine ways of developing ecological research expertise. In addition, BRT initiated a pioneering project concerned with the ecology of Tao Dum Forest in Kanchanaburi Province. Tao Dum is an area of rich biodiversity in Thailand's Western Forest Complex and adjacent to the Huay Kha Khaeng-Thung Yai Naresuan World Heritage Site.

BRT supports the study of species from micro-organisms (such as bacteria, diatoms, phytoplankton, zooplankton and algae) to larger, more complex organisms (including lichens, fungi, flowering plants, invertebrates and vertebrates). Since 1995, more than 250 species have been identified that are new to science or to Thailand as a direct result of BRT-funded projects.

Plant taxonomic studies funded by BRT have been initiated on those families and genera given high priority by the Forestry Herbarium of the RFD. These studies are progressing well and have yielded more than 20 new species. Similarly, research on the biology of animals has been rewarding, especially for invertebrates, such as insects, edible animals, four-legged mites, fairy shrimps, rotifers, benthic animals, sponges, protozoa, helminths, aquatic snails and microsnails. More than 230 new species have been identified.

Although BRT funds projects on fish, birds, reptiles, amphibians and mammals, there is still a paucity of research on vertebrates. BRT-supported research on this important animal group covers both extant vertebrates and vertebrate fossils. Rare vertebrate groups, such as bats, have so far received little attention, although BRT has given them a high research priority.

Overall, biodiversity studies of bacteria, plants and animals are progressing well and have resulted in 76 published papers, in both national and international journals, as well as 111 manuscripts being prepared for publication.

Investigating the relationships among biodiversity, social activities and traditional knowledge continues to be an important field of interest for Thai researchers. Six projects focusing on the development of ecotourism in Mae Hong Son Province will be useful in developing strategies for the sustainable development of ecotourism. BRT has started area-based programs in such biotically rich sites as the Tao Dum Forest in Kanchanaburi Province and the Bala-Hala Forest, at the junction of Narathiwat and Yala Provinces near the Malaysian border.

Local communities and the economics of natural resource use are another focus of research. Data on the economic value of biodiversity is important input in developing policies for natural resource conservation, but there are few studies on community economics. One project studied the use of non-timber forest products by 12 villages in the area of the proposed Kaeng Sua Ten Dam, in Mae Yom National Park, Phrae Province. NTFPs commonly gathered from this forest include numerous species of mushroom, various bamboo shoots, wild vegetables and ants' eggs, used for local consumption and for sale throughout the province. These products have a commercial value of over 70 M baht per year (ca. US$1.75 M). If the dam is constructed and the forest inundated this is only one of the economic losses associated with biodiversity resources which local villagers would suffer. Apart from wild food, the forest is also a source of medicinal plants that are very highly valued by local people and, increasingly, throughout Thailand. For the villagers of this area, the forest therefore functions as both the local drug store and supermarket.

In 1999, BRT organised a number of round-table discussions for researchers and students of biodiversity with similar fields of interest. Discussions were held on plants, insects, edible animals, micro-organisms, genetics and ecological relations. The group discussions were designed to encourage joint learning and develop working links within and among groups. They were also intended to promote the interaction of researchers with local experts and those people with indigenous knowledge.

The information about biodiversity acquired through BRT-funded research needs to be distributed to those who can best use it. To this end, BRT has already published three books in the series "Thai Studies in Biodiversity". In addition, a compilation of biodiversity research conducted in Thailand has been prepared, providing critical information for researchers, managers and others concerned with the conservation of biodiversity.

The BRT program also supports research on the sustainable development of biotechnology for social and commercial purposes. In 1999, this included six projects with a total budget of 6.4 M baht (US $ 0.17 M). BRT also supported a policy study on biodiversity management. This project, with a budget of 0.4 M baht (US $11,000), follows from two earlier projects, one on policy and regulation of bioresource assessment and the other on the feasibility of a centre for coordinating biodiversity matters. Results from those two projects will be important for establishing the Thailand Biodiversity Centre (TBC) to facilitate the protection, management and research of Thailand's biodiversity.

BRT's programs have made good progress in documenting the biodiversity of Thailand and developing skills for research and management of this vast natural resource. Careful planning, based on sound research and the proper application of indigenous knowledge, and complemented by greater public awareness and participation, is an effective way of promoting the conservation and sustainable use of biodiversity.

Thailand Biodiversity Centre

The establishment of the Thailand Biodiversity Centre (TBC), under a decree approved by the Prime Minister in February 2000, is a significant institutional innovation stemming from the NBSAP. The Biodiversity Conservation and Sustainable Use decree and associated regulation provides for a National Biodiversity Board and its secretariat, the Thailand Biodiversity Centre. This new agency will function as the CBD clearing house and support research and programs relating to access and sharing of benefits from biodiversity use. The TBC will work closely with the National Centre for Genetic Engineering and Biotechnology of MOSTE. The new agency is faced with a number of challenges relating to staffing, budgets and breadth of responsibility.

Staff

In staffing the Centre, care must be taken to attract people who are familiar with related government and non-government agencies. Staff will need to build close working links with many partners. That kind of experience and expertise is limited, but exists to some extent in agencies such as OEPP, RFD and MOAC. During the start-up phase, appropriate staff may need to be transferred to the Centre to train others and initiate key programs. TBC lacks the institutional authority of resource managers such as the forest and fisheries departments, and needs to carefully nurture supportive relations with the agencies responsible for administering biodiversity related legislation.

Budget

TBC is attached to the National Centre for Genetic Engineering and Biotechnology, which has limited funds. While there are plans for the TBC to generate its own income through commercial arrangements with biodiversity resources, initially it will be reliant on modest government budgetary support. It is not known whether the centre will have the resources to address the many complex issues within its mandate. It is required, for example, to examine the sustainability and commercial implications of bio-safety policies, an issue of growing importance that could absorb its complete attention.

Lessons learned

Lack of investment in staff development

The government appreciates that there is a lack of information on biological resources but there has been relatively little investment in developing the skills of personnel directly involved in research and information management and no growth in total staff numbers. This is a serious impediment to NBSAP implementation.

Uncertain resources

In situations of economic constraint, resources for environment management are the first to go. In 1997, Thailand and other countries of South East Asia faced a major economic crisis. They responded by giving economic development and reform issues a higher priority and giving environmental problems even less attention and support than before. Although Thailand is regarded as one of the emerging industrial nations, the government will continue to direct more attention to economic development and considerably less to the preservation of the biodiversity resources.

Use of existing sector programs

Working through existing sector programs and budgets is the best way to integration. In many cases, integrating biodiversity conservation and sustainable use elements into policies and programs of government sectors may not require adjustments to total budgets. For example, the maintenance of species diversity, especially indigenous species, in reforestation and plantation activities requires a shift in operational strategy without the need for further funding.

Resource inventories

Resource inventory work discloses obstacles to biodiversity conservation. The most important benefit gained from the resource inventory may be the identification of problems and weak points associated with the conservation and management of biodiversity. Obtaining information about the location of biodiversity hot spots and endangered species provides an indication of where resources available to support conservation efforts should be best targeted to achieve conservation objectives.

Integrating development and conservation

Innovative NGO and community-supported conservation projects are largely overlooked by government. Because of competing economic development and

biodiversity conservation interests, there is an urgent need to integrate the pursuit of economic development and conservation goals. These two objectives have been seen by government as being mutually exclusive, while NGO and community-supported grassroots programs tend to interpret and address them in a much more inclusive manner. Given the new constitutional requirements for local involvement in natural resource management, lessons from NGO and grassroots integrated conservation and development projects could contribute to developing more effective future biodiversity conservation approaches in Thailand.

GEF investment hurdles

The refusal of GEF to invest in Thailand has had a negative impact. Those responsible for environmental management in Thailand have made sound progress in implementing the convention despite the severe budget constraints and delays in the ratification process. This effort has been greatly retarded by being denied access to GEF funds. It would appear to be contradictory to the objectives of the CBD and GEF to refuse support merely because Thailand is not yet a party to the convention. GEF investment could benefit biodiversity conservation and bring greater political attention and commitment to the CBD.

Recommendations

Although Thailand's ratification of the convention has proved to be a controversial and time-consuming process, the government has initiated and implemented a number of activities that respond substantially to its objectives. There is still a long way to go, however, before all aspects of the CBD are adequately addressed. Reform and improvements are needed in the following areas:

- increased institutional capacity and human resources to study, inventory, conserve and manage biodiversity in and outside protected areas;
- expanded participation of local communities, non-government organizations, and private enterprise in the conservation of biodiversity;
- greater efficiency in monitoring and controlling processes and activities that threaten biodiversity;
- management of biodiversity and protected areas within the framework of rural economic conditions which require that sustainable use by local communities be legitimized and harmonized with the goal of conserving critical habitats and species; and

- increased cooperation between institutions, both domestically and internationally, in the conservation and sustainable use of biodiversity.

It is important to continue to set strict priorities for action. Even with greater public demand for a better environment, for some time to come budgets allocated to environment management will remain comparatively low when compared to those for finance and economic sectors. Thus, procedures for setting strict priorities in biodiversity conservation and management activities must be followed so that limited resources are channelled to where they are most needed.

Chronology

1947	*National Fisheries Act* provides guidelines for sustainable fisheries management
1950-2000	Thailand's forest area reduced by over 50 per cent.
1960s	Formal establishment of National Protected Area System.
1964	Revised *National Forest Act* outlines forest management requirements for sustainable use.
1980	Rice Seed Storage Laboratory established.
1985	Establishment of National Gene Bank.
1989	National ban on logging in natural forests. Thailand Science Society biodiversity conference produces recommendations for human and institutional resources for biodiversity research.
1992	Establishment of government-supported Thailand Environment Fund. *Enhancement and Conservation of National Environmental Quality Act* Regulations on collection and conservation of botanical resources. Coastal fishery development project aims at developing sustainable fishing methods.
1992-1997	National Forest Rehabilitation Program.
1993	National Committee on CBD appointed. Draft regulation on access to biological resources. National Environment Board (NEB) appoints CBD Sub-Committee.
1995	Commence formulation of National Biodiversity Strategy and Action Plan (NBSAP). UNEP support for OEPP to product National Biodiversity Status Report.

1995-1998	Thai Biodiversity Data Management Project with technical support from WCMC. DANCED support for National Wetlands Inventory.
1995	National organization established for ex-situ genetic resource conservation.
1996	Formulation of Biodiversity Research and Training Program within MOSTE
1997	Cabinet approves NBSAP (1998-2002). Local community rights to sustainably manage natural resources enshrined in Constitution.
1997-2000	DANCED support for National Forest Genetic Resource Conservation and Management.
1997-1999	Thai economic crisis reduces budget earmarked for support of NBSAP.
1998	Formation of National Resources and Biodiversity Institution within MOAC. Passage of Traditional Medicine Act and Plant Intellectual Property Act.
1999	BRT roundtable discussions on plants, insects, animals, microbes, genetics and eco-relationships.
2000	Thailand Biodiversity Centre (TBC) established as CBD clearing house. National Constitutional Court decides that CBD ratification requires Parliamentary approval.

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