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Conservation of Protected Areas in Thailand:
The Case of Khao Yai National Park

The General Setting

Thailand is a country rich in natural resources. Its mild year-round climate and high humidity and rainfall support a biologically diverse flora and fauna that include tropical, deciduous, and mangrove forests. Each forest type provides a unique habitat for plants and animals. Thailand's tropical climate supports not only fertile forests, but also colorful and fragile coral reefs and marine ecosystems. There are 3,000 km of coral reefs along Thailand's coastline (Gray et al. 1994). Thailand's rich biodiversity is evidenced by the 3,000 species of fungi, 600 species of ferns, over 1,000 types of orchids, and 282 mammalian species (Gray et al. 1994). Species such as the Asian elephant, tiger, and hornbill are endangered. Some forests contain valuable trees such as teak, rosewood, bamboo, and rattan. These tree species are in high demand for furniture making, housing, and the export market (Gray et al. 1994).

Thailand's 513,115 sq km of land is divided into four natural regions (Mewongukurd 1987). The mountainous Northwest region contains natural forests, ridges, and deep, narrow valleys. The Northeast region is a plateau that occupies one-third of the total area of Thailand (Nuttonson 1963). It has very favorable soils and climate, which supports agricultural production (Donner 1978). The Central region contains the most valuable land in Thailand (Nuttonson 1963). The Southern region is mountainous and contains two enormous mountain ranges (Donner 1978).

Thailand has a tropical climate with wet and dry seasons (Nuttonson 1963; Vithayarut 1988). The two northern regions of Thailand receive most of their moisture from tropical storms and typhoons. The Central region is influenced by both monsoon and local storms and has similar weather to the two northern regions (Nuttonson 1963). South Thailand, which is surrounded by seas, has the highest rainfall in the country.

Climate, soils and other biophysical features determine the spatial distribution of Thailand's evergreen and deciduous forests. Tropical evergreen forest is the predomi-

nant type. Teak, which is located in the northern forests, is the most valuable and abundant tree species (Royal Forestry Department 1996). Thailand's natural forested areas provide ecological services—such as providing clean water and air, mitigating floods and droughts and pest control—that benefit people and communities (Daily 1997). Mangrove forests play a key role in protecting coastal areas from strong winds and wastewater.

Thailand is historically an agricultural country. The main agricultural export commodities are maize, cassava roots, rubber, and sugarcane (Bangkok Bank 1996). Export value of livestock products has continually increased, whereas timber exports have declined slightly because of the ban (since 1989) on logging in natural forests and mangrove conservation.

Water is crucial for Thailand's economic development and transportation system (Donner 1978). Thailand has two major rivers, the Chao Pharya and Mekong, and other local rivers, such as the Chi and Mun in the Northeast. Riverine areas comprise the heart of cultivation in the Central Plain and Northeast regions.

Rapid growth in the Thai economy has resulted in increased demand for land, energy, agricultural products, raw materials and investment. Real gross domestic product trended upward in the mid-1990s along with other indicators, such as the value of exports and imports (Bangkok Bank 1996). However, many Southeast Asian economies collapsed in 1998 because of fundamental economic problems.

Natural Areas and National Parks

The Royal Forest Department was established in 1896 to manage the country's forests. The first act to conserve wildlife was the Wild Elephant Protection Law in 1900. This law was enacted because of significant declines in elephant populations. The Wild Animals Reservation and Protection Act of 1960 (WARPA) regulates the establishment of wildlife sanctuaries and nonhunting areas (Gray et al. 1994). Khao Yai National Park, Thailand's first, was established in 1962. Three additional national parks and one wildlife sanctuary were established in the 1960s (Dixon and Sherman 1990; Ghimire 1994; Gray et al. 1994).

During World War II, the population of Thailand was 15 million and the forested area was about 70% of total land area. Forested lands have since decreased significantly due to rapid post-war economic development and population growth, so that in 1995 only about 26% of the country was forested (Gray et al. 1994; Royal Forestry Department 1996). Expansion in farmland and construction of dams, roads, and other infrastructure

caused significant losses in natural areas. In addition, over-fishing, shrimp farming, dynamiting, and booming tourism degraded ecosystems in general (Gray et al. 1994). Some natural areas have been damaged as well because of these pressures.

In 1989, a ban was placed on logging in Thailand's natural forests, including the national parks. Since then, many areas have been established as national parks and wildlife sanctuaries (IUCN 1992). Currently, Thailand has 95 national parks (Thaiparks.com 2001), 42 wildlife sanctuaries, 50 non-hunting areas, 57 forest parks, and several other protected areas, including mangrove forests, botanical gardens, and arboretums (Royal Forestry Department 1996). The total size of Thailand's protected areas is approximately 84,616 sq km, or 16% of the country's land area (Royal Forestry Department 1996; Thaiparks.com 2001). Tables 1 and 2 show the distribution of national parks in Thailand by region and size, respectively. To achieve the Thai government's goal of conserving 40% of the country's forested land area, several management plans have been issued in the last decade (IUCN 1992). The reforestation plans have a goal of using natural resources in a sustainable manner.

Table 1. Regional distribution of national parks in Thailand. Source: Thaiparks.com 2001.

Region	Percent
North	38
Central	20
Northeast	18
South	23

Table 2. Size Distribution of National Parks in Thailand. Note: Data for two national parks are missing. Sources: Gray et al. 1994; Thaiparks.com 2001.

Size (sq km)	Number	Percent
More than 1,000	14	15
801-1,000	5	5
601-800	7	8
401-600	15	16
201-400	26	28
0-200	26	28
Total	93	100

The legal authority for Thailand's protected areas is the WARPA of 1960 and the National Park Act of 1961 (Arbhabhirama et al. 1988; Dixon and Sherman 1990; Gray et al. 1994). There are four main types of protected areas in Thailand: national park, wildlife sanctuary, non-hunting area, and forest park. The purpose of a *national park* is to preserve a natural area for educational and recreational activities, which are defined by the National Park Act of 1961 (Arbhabhirama et al. 1988). The National Park Division of the Royal Forest Department administers all national parks according to established guidelines (Dixon and Sherman 1990). The Royal Forestry Department receives assistance from the Tourism Authority of Thailand and related organizations in surveying and establishing new national parks.

A *wildlife sanctuary* is designed to conserve habitat in which wildlife can breed and expand in a natural setting (Dixon and Sherman 1990). Educational and research activities are allowed. The Wildlife Conservation Division of the Royal Forestry Department has responsibility for managing wildlife sanctuaries. Of Thailand's 42 wildlife sanctuaries, Haui Kha Khaeng and Thung Yai Naresuan were the first to be established.

A *non-hunting area* is protected from hunting and capture of animals and dedicated to conserving specific wildlife species. There are 50 non-hunting areas in Thailand, some of which allow educational and limited recreational activities (Arbhabhirama et al. 1988). Non-hunting areas are under the authority of the Wildlife Conservation Division. Compared with wildlife sanctuaries and national parks, non-hunting areas are smaller, protection is afforded only for specific species, and fishing, recreation, tourism, logging, and collection of plants and herbs are allowed (Dixon and Sherman 1990).

A *forest park* is smaller than a national park and contains features considered valuable for recreation, e.g., waterfalls and caves (Dixon and Sherman 1990). There are 57 forest parks in Thailand.

Other kinds of protected areas include *botanical gardens* (15 total), which are reserved for collecting and planting native and exotic rare and economically valuable plant species; *arboretums* (47 total), used for collecting and preserving useful plants and flowering plant species (Dixon and Sherman 1990); and designated *watersheds*, which are classified based on the land-use activities that occur within them. The level of protection afforded watersheds depends on physical characteristics of the landscape, such as elevation, slope, geology, and soils (Arbhabhirama et al. 1988).

Most of the income from national parks and other protected areas (excluding wildlife sanctuaries) is de-

rived from recreation and tourism. Those activities are thus primary motivations for establishing natural and protected areas in Thailand.

Problems in Protecting National Parks

As with the country's natural environment as a whole, the protected areas of Thailand have been degraded by rapid growth in population; exploitation of timber, land and energy; tourism; and residential development. As far as recreation is concerned, national parks are especially popular for hiking, camping, and sight-seeing. Currently, Thai tourists outnumber foreign tourists in the national parks because of a lack of promotion and tourist information written in foreign languages (Arbhabhirama et al. 1988).

The intentional and unintentional acts of tourists disturb fragile ecosystems. For example, the Phi Phi Islands (Phuket) are popular because of their beautiful coral reefs and beaches. The white sand beaches of the islands have been degraded by growth in resorts and poorly planned human waste disposal. Tourists who break off pieces of coral reef as souvenirs, or who anchor their boats to reefs, have caused extensive damage. Tourist-related developments have degraded other protected areas. For example, Doi Suthep National Park in the North is well known for its Buddhist temple. Roads, parking lots, and other tourist facilities have been built in the park, and the government has allowed construction of a cable car from the foothill to the temple area.

Despite the official ban on logging, deforestation continues in Thailand's protected areas. A primary cause is the increasing demand for agricultural and forest products, and the conversion of land to aquaculture. Local residents and hill tribes contribute to deforestation by practicing shifting cultivation, which has degraded the quality of soil and water, particularly in national parks located in the northern and northeastern regions of Thailand. Resident populations can be high; for example, approximately, 4,000 Hmong and Karen people live in the Haui Kha Khaeng and Thung Yai Naresuan wildlife sanctuaries (Arbhabhirama et al. 1988). Furthermore, many national parks are surrounded by local villages whose residents tend to run out of forested land because much of it is clear-cut to make way for agricultural production (Arbhabhirama et al. 1988). The resultant illegal poaching and logging in national parks have had a negative impact on endangered species, including hornbills, elephants, and tigers. There is illegal local and international animal trade, which the Royal Forestry Department is not able to control.

Management of Thailand's national parks focuses on direct and indirect protection. Direct protection is the responsibility of National Park

Division headquarters, which has a branch in every national park. Their job is to control illegal activities and provide visitor services for tourists. Rangers patrol the vicinity of park boundaries to deter illegal activities and create goodwill in local communities. Indirect protection relies on radio, television, and brochures to increase nature appreciation.

Although the National Park Division of the Royal Forestry Department putatively manages natural resources according to a plan, on-the-ground management has not achieved its goals because of two problems with the national park system:

- The inadequate budget of the Royal Forestry Department limits effective management. Since the Thai government is less concerned with biological conservation than economic development, only a small portion of the national budget is allocated to the management of protected areas. In 1995, the budget for forest conservation was the equivalent of US$347 million—just 1.2% percent of the forestry department's total budget of US$2.86 billion (Kaosa-ard 1995). This relatively small budget hinders the park's ability to control illegal activities, such as poaching.
- Unauthorized settlements of local villagers and hill tribes in national parks have become a serious problem. Poor relationships between local people and law enforcement agencies have resulted in inefficient management and major conflicts. Law enforcement is used to try to control the illegal use of forested land. This of course negates the traditional rights of local people to use the land now included in the parks for agriculture and other activities. While villagers have not received compensation for these losses, the Royal Forestry Department has offered to relocate them to areas outside of and adjacent to parks. However, many national park managers believe that relocation of such settlements is not feasible. The Royal Forestry Department has been unable to solve this problem (Ghimire 1994).

Khao Yai National Park

In 1962, Khao Yai was established as Thailand's first national park (Figue 1). This biologically diverse park contains numerous endangered species, including elephant, gaur, hornbill, and tiger. The park is home to 200 Asian elephants, 318 migrant and resident bird species, three species of hornbills, and 5,000 species of butterflies (Gray et al. 1994; Thaiparks.com 2001). The park supplies agricultural water to four provinces. Due to its rich biodiversity, Khao Yai is also a magnet for illegal collecting, logging, and poaching.

Figure 1. General location of Khao Yai National Park.

Khao Yai has a total area of 2,169 sq km. The park has elevations in excess of 1,000 m and many valleys and plateaus. Along with some grasslands, the park contains hill evergreen, dry evergreen, dry mixed deciduous, and secondary-growth forests, with most areas being in tropical rain forest (TDRI 1995; Kasetsart University 1993).

Since Khao Yai is only 200 km from Bangkok, Thailand's capital and largest city, it is a popular destination for Thai and foreign tourists. The number of tourists visiting the park increases every year. The five most popular tourist activities in the park are visiting waterfalls (Figure 2), viewing scenery, leisure walking, trekking, and wildlife watching (TDRI 1995). The park provides housing accommodations and other facilities, including a visitor center, a big open room for presentations, restaurants, and a small souvenir shop. Lodging and camping facilities have a limit of 1,900 people. Trekkers are limited to 100 per day, and visitors to the open room, to 500. Half of the revenues generated by Khao Yai come from tourism and the other half from the government (TDRI 1995).

The Forestry Faculty of Kasetsart University has identified several problems in the park. Insufficient law enforcement capabilities have hampered the ability to protect the park's

Figure 2. Two of Khao Yai's renowned waterfalls: Haew Surat (l) and Haew Narok.

natural resources. Local villagers engage in illegal logging and poaching in the park. The arrest rate remains high, even though a previous development plan tried to reduce illegal uses of the park. Forested areas of Khao Yai are subject to continuous human disturbance for several reasons:

- The insufficient amount of available agricultural land causes villagers to move to areas adjacent to Khao Yai, and limited income sources cause them to collect and sell forest products from the park.
- Sections of the park itself contain permanent villages, including roads and other infrastructure.
- Local villagers, both inside and outside the park, lack the knowledge and goodwill needed to support conservation.
- Development plans made by other governmental departments often contradict the goals of park management, e.g., expanding agricultural projects encourage villagers to cut forested areas.

Increasing pressure from visitation has caused several problems as well. Human waste has become a problem because disposal facilities are insufficient and the methods used, such as incineration and burying, are inadequate. Public health measures in the area's restaurants are below standards, which results in periodic outbreaks of disease in both humans and animals.

Wildlife in the park is directly threatened by human activities and many species are almost extinct on a local basis. Poaching has thrived because it is profitable for local restaurants surrounding the park to use certain organs of animals in preparing expensive dishes. Continued destruction of wildlife habitat has occurred due to conversion of forestland to agricultural land in areas adjacent to the park. Increased use of pesticides has harmed wildlife. Exotic species have increased disease transmission and compete with native species for habitat. Finally, there are not enough experienced wildlife specialists to monitor wildlife populations and protect their habitat.

Park Administration

Since Khao Yai is large, administration of the park requires highly qualified personnel and effective cooperation between officials of the National Park Division and the four provinces that the park covers. Administrative management of the park has been stymied by three factors. First, the current administrative structure is not compatible with the number and scope of management tasks and the large size of the park. Second, the quality and quantity of personnel are insufficient, and the park budget, very limited to begin with, is declining. The 2000 budget was 18 million baht (US$453,000), significantly less than the 1998 budget of 27 million baht (US

$680,000) (U. Suphanpong, personal communication). Third, coordination of policy and management activities among departments has been inadequate. Currently, promotion done by the Tourism Authority of Thailand conflicts somewhat with the conservation of park resources. Fourth, private land development, in the form of golf courses and resorts, is degrading the park's natural resources.

The Forestry Faculty of Kasetsart University has responsibility for studying park management problems and preparing the master management plan (Khao Yai Management Master Plan II) for the Royal Forest Department. The plan is based on terms of reference issued by managers of national parks and wildlife sanctuaries, and aims to resolve existing problems and improve park administration.

Conclusion

The case of Khao Yai National Park illustrates well the challenges faced by park managers and those concerned about conserving the biodiversity and natural resources of Thailand's protected areas. The country faces unrelenting pressures on natural resources from population and income growth, which have resulted in rapid depletion of forests and associated biodiversity and encroachment of protected areas. In addition, there are long-standing equity issues related to the treatment of local people in and near the parks. In this respect, Thailand is typical of many rapidly developing countries. Hopefully, rational planning efforts, such as Kasetsart University's plan for Khao Yai National Park, will result in a higher level of protection for Thailand's protected areas.

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