

World Heritage Sites

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THUNGYAI - HUAI KHA KHAENG WILDLIFE SANCTUARIES THAILAND

These two mountain forest sanctuaries cover 600 km and over 620,000 ha spread along the Myanmar border. They are in nearly pristine condition and the flora is extremely diverse. Four biogeographic realms meet here which contain almost all the forest types of mainland Southeastern Asia and protect one of the world's largest dry tropical forests. There is a correspondingly wide array of animals which include 77% of the large mammals, including elephants and tigers, 50% of the large birds and 33% of the terrestrial vertebrates found in the region.

COUNTRY

Thailand

NAME

Thungyai - Huai Kha Khaeng Wildlife Sanctuaries

NATURAL WORLD HERITAGE SERIAL SITE

1991: Inscribed together on the World Heritage List under Natural Criteria vii, ix & x.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

IUCN MANAGEMENT CATEGORY

Thungyai-Naresuan Wildlife Sanctuary:

IV Habitat/Species Management Area

Huai Kha Khaeng Wildlife Sanctuary:

IV Habitat/Species Management Area

BIOGEOGRAPHICAL PROVINCE

Indochinese Rainforest (4.5.1)

GEOGRAPHICAL LOCATION

Thungyai-Naresuan is located about 300 km northwest of Bangkok, next to the Myanmar border at the south end of the Dawna-Tenasserim range. Coordinates: 14°55' to 15°45' N by 98°28' to 99°05' E. Huai Kha Khaeng adjoins it to the east between 15°00' to 15°50' N and 99°00' to 99°28' E.

DATES AND HISTORY OF ESTABLISHMENT

1972: Thungyai - Naresuan Wildlife Sanctuary established under the 1960 Wild Animals Reservation and Protection Act, which was re-enacted in 1992;

1974: Huai Kha Khaeng Wildlife Sanctuary established under the same Act;

1990: Nam Choan Forest Reserve saved from damming for addition to Thungyai;

2005: Designated an ASEAN Heritage Park.

LAND TENURE

Government, in Kanchanaburi, Tak and Uthai Thani provinces. The two sanctuaries are administered separately by Wildlife and Plant Conservation Division of the Royal Forest Department, within the Ministry of Natural Resources and Environment.

AREA

577,464ha: comprising Thungyai-Naresuan, 320,000ha and Huai Kha Khaeng, 257,464ha. The total area is 622,200 ha when the Nam Choan Forest Reserve (44,720 ha) addition to Thungyai is included. This forms the largest World Heritage conservation area in continental Southeast Asia.

The complex of neighbouring protected areas totals 1,208,300ha. It includes Umphang Wildlife Sanctuary contiguous to the north, and to the south, Khao Laem National Park and Bung Kroeng Kawia Non-Hunting Area. Other parts of the complex are: Sri Nakarin National Park, Erawan National Park, Sai Yok National Park, Chaloeam Rattankosin National Park and Salak Phra Wildlife Sanctuary. A Western Forest Complex Ecosystem Management Program in the area extends over 1,873,000ha.

ALTITUDE

250m-1,811m (Khao Thai Par peak, Thungyai); 1,678m (Khao Pai peak in Huai Kha Khaeng).

PHYSICAL FEATURES

The Sanctuaries are in one of Thailand's least accessible and least disturbed forested areas, among mountains with some eighteen peaks over 1,000m and a great number of valleys and small lowland plains. They cover the headwaters of two important river systems, the upper Kwaie Yai occupying half of Thungyai, which feeds south to the Sri Nakarin dam; and the Kha Khaeng system to its east which occupies most of Huai Kha Khaeng Sanctuary and flows south into the Kwai Yai beyond the site. Within Thung Yai there are also the Mae Klong and Mae Chan, both deep fast flowing rivers with steep banks, muddy bottoms, frequent rapids and rocky ravines, which flow into the Kwai Yai; the Kwaie Noi, which feeds south into Khao Laem Reservoir; and the Mae Kasart and Mae Suriat which flow west into Myanmar. The Thungyai Sanctuary has the more dissected topography. Its distinguishing feature is a 14,000 ha central grassy plain, from which it takes its name of 'big field'. Within Huai Kha Khaeng there are also the upper headwaters of the Thap Salao, which flows east into the Sakrae Krang and Mae Klong rivers. The banks of the accessible lowland rivers within the Sanctuaries are still unmodified and well forested which is uncommon in Thailand.

The area contains outstanding examples of the rock formations which distinguish the western edge of mainland southeast Asia from the more stable continental core; and the impact of geological activity on an area of pristine dry tropical forest is here exemplified better than anywhere else. Red-brown earths and red-yellow podzols are the predominant soils, the former deriving from limestone found in the level uplands and the Mae Chan valley; the latter is found in the Huai Kha Khaeng valley. Small lakes, ponds and swampy areas occur, some being seasonal, others perennial; these are important wildlife habitats. There is striking karst topography: limestone sinkholes are found, most being only about 20m in diameter and 10-12m deep, but some are more than two kilometres long, 250m wide and drop as much as 30m (Nakahasithien & Stewart-Cox, 1990). A physical feature important for wildlife is the presence of mineral licks. These are both wet and dry and occur throughout the Sanctuaries. Most appear around granite intrusions in areas with red-yellow podzolic soil and may be associated with massive faults in the intensely folded geomorphology of the area.

CLIMATE

Conditions range from tropical to semi-tropical. The climate is monsoonal, with a dry season from November to April, and a hot wet season from May to October. Mean annual rainfall in the west is 2400-2000mm, falling most heavily during the south-west monsoon in September to October. Mean minimum and maximum temperatures during the hot season range from 15°C to 35°C (Thungyai), 20°C to 37°C (Huai Kha Khaeng), and 10°C to 29°C during the cooler season. Minimum and maximum temperatures are 7°C to 40°C.

VEGETATION

The vegetation is largely undisturbed as little logging or swidden farming has been practised in the past. There are nine principal vegetation types. The highest slopes are covered with hill evergreen forest (also called tropical lower montane rain forest, 93,300ha). Slopes above 600m generally support seasonal dry semi-evergreen forest (159,200ha). This is tall, dense, stratified, always dominated by Dipterocarps, and may appear to be evergreen in wet areas such as the central uplands. At lower altitudes mixed deciduous (117,300ha) and bamboo forests (18,300ha) predominate, with dry deciduous dipterocarp forest (38,100 ha) occurring in areas with poor or shallow soil. There is also savanna forest (9,900ha) which, with grassland, occurs at every elevation; also areas of swidden agriculture (15,400ha). In lowland areas, mainly near the larger rivers, there are some small patches of open grassland, especially in Thungyai (3,900ha). The most important wetlands are those along the upper Kwaie Yai and its tributaries. The result is often a patchy mosaic of vegetation types, particularly in the broad valley bottoms. (Round, 1988). In particularly moist areas along rivers and streams, evergreen gallery forest is present. This is noticeably lushier than other formations, and harbours many more creepers, climbers and epiphytes, with emergent trees as high as 40m. This forest sustains a higher than usual level of biological diversity compared with the more widespread but drier habitats, especially during dry season fires.

The mixed deciduous forest is dominated by *Lagerstroemia calyculata* associations, although pure stands of *Xylia xylocarpa* are found. Dry dipterocarp forest is unique to mainland southeast Asia, and is dominated by five xerophilous dipterocarps. It is confined to the poorest and most porous soils where fire occurs. Some 17 main tree species occur in the savanna forests, of which *L. macrocarpa*, *Stereospermum nueranthum*, *Terminalia chebula* and *Dalbergia cultrata* are among the most common. Trees within grassland are smaller, generally of the same genera, but not exceeding 5m and are stunted by fire or edaphic constraints. Commercially important tree species include teak *Tectona grandis*, *Terminalia nudiflora*, *Lagerstroemia calyculata*, *Xylia kerii*, *X. xylocarpa*, *Dipterocarpus alatus*, and *Anisoptera cochinchinensis* (RFD, n.d). Secondary forest on areas of former swidden agriculture are found in the Mae Chan valley and central uplands towards the east. Swidden agriculture was practised mainly on the most fertile ground which indicates where some of the richest forest has been destroyed but also that there is a good chance of regeneration. Characteristic species are those that grow in the surrounding forest, including *L. macrocarpa*, *Vitex peduncularis*, *Bauhinia acuminata* and *Albizia odoratissima*.

FAUNA

The fauna of both Thung Yai and Huai Kha Khaeng includes an unusual mix of species with Indo-Chinese (dominant), Indo-Burmese and Sino-Himalayan affinities plus a strong Sundaic element. A small proportion is Palearctic. The ranges of many of these species reach their limits of distribution within the Sanctuaries without overlapping. The Sanctuaries support at least a third of all terrestrial vertebrates known from southeast Asia, almost two-thirds of the region's large mammals and many of its large birds. These include some 120 mammals, 400 birds, 96 reptiles, 43 amphibians and 113 freshwater fish, and a number of species suspected but not confirmed (IUCN, 2004). Thirty-four internationally threatened species are found in the sanctuaries (IUCN, 1991). A detailed summary discussion of the fauna and species lists for the combined Sanctuaries are given in Nakahasithien & Stewart-Cox (1990).

Huai Kha Khaeng Sanctuary holds a good number of Thailand's animal species, including several more commonly seen in the north or south of the country. Of the country's 265 mammals, 67 are known to occur in this sanctuary (Lekagul & McNeely, 1977; Nakasathien *et al.*, 1987). Among these are three of the Reserved Wildlife Species of Thailand: Sumatran serow *Capricornis sumatraensis* (VU), hog deer *Axis porcinus* (EN) and wild Indian water buffalo *Bubalus arnee* (EN): the only herd of wild water buffalo in Thailand, of some 25-50 animals, lives in the south of the Sanctuary, though there may have been interbreeding with domestic animals. Hog deer are said to have been seen at least twice just south of Huai Mae Dee, a tributary of the Huai Kha Khaeng, but they are assumed to be very few. The presence

of another rarity, the Thai brow-antlered deer *Rucervus eldii siamensis* (EN), has not been definitely confirmed since two were shot in 1965.

All five macaque species occurring in Thailand are present: rhesus *Macaca mulatta*, crab-eating *M. fascicularis*, southern pig-tailed *M. nemestrina* (VU), stump-tailed *M. arctoides* (VU) and Assam *M. assamensis*. The presence of these sympatric species may be the result of the area having been a Pleistocene refugium (Eudey, 1979). Other primates include silvery lutung *Trachypithecus cristata*, Phayre's leaf-monkey *Trachypithecus phayrei* (EN), and white-handed gibbon *Hylobates lar*. Other threatened mammals include Asiatic wild dog *Cuon alpinus* (EN), two otters, oriental small-clawed *Aonyx cinerea* (VU) and smooth-coated *Lutra perspicillata* (VU), and a number of felids and viverrids: Indochinese tiger *Panthera tigris corbetti* (EN), clouded leopard *Neofelis diardi* (VU), leopard *Panthera pardus*, black forms being as often seen as spotted. There are also Asian elephant *Elephas maximus* (EN), estimated in 1979 at 150-200 animals (Storer) Sumatran rhinoceros *Dicerorhinus sumatraensis* (CR), Fea's muntjac *Muntiacus feae* and Asian tapir *Tapirus indicus* (EN) which is rarely seen, though tracks are common in parts of the sanctuary. Gaur *Bos gaurus* (VU) and banteng *Bos javanicus* (EN) are still fairly common, although they have become increasingly rare elsewhere in Thailand due to poaching.

Thung Yai has not yet been comprehensively surveyed, but is also known to support a sizeable proportion of Thailand's fauna (Nakasathien *et al.*, 1987). It is extensive enough to contain several of the larger and increasingly rare mammals such as tiger (EN), leopard, clouded leopard (VU), elephant (EN), Asian tapir (EN), Sumatran rhinoceros (CR), gaur (VU), serow (VU) and hog deer (EN). A herd of 50 gaur was seen in 1985, making it the largest herd then recorded in Thailand (P. Round, pers. comm.). The Javan rhinoceros *Dicerorhinus sondaicus annamiticus* (EN) is said to have existed in the area and a track was photographed in 1988 (J. Thorsell, pers. comm., 1991).

Of Thailand's 900 species of birds, 355 had been recorded in the Sanctuaries in 1988 (Round, 1988; Nakasathien *et al.*, 1987). Many of these are now rare in Thailand, including white-winged wood duck *Cairina scutulata* (EN), red-headed vulture *Sarcogyps calvus* (CR), lesser fish-eagle *Ichthyophaga humilis*, Kalij pheasant *Lophura leucomelanos*, Burmese peacock-pheasant *Polyplectron bicalcaratum*, green peafowl *Pavo muticus* (EN), a wide range of woodpeckers, rufous-necked hornbill *Aceros nipalensis* (VU) and Asian paradise flycatcher *Terpsiphone paradisi* (Bhumpakkapan *et al.*, 1985). Also present are several nationally rare species of reptiles and amphibians, including Bengal monitor *Varanus bengalensis*, giant Asiatic toad *Phrynooides aspera* and giant Asian giant river frog *Limnonectes blythii* (Bhumpakkapan *et al.*, 1985; Chanard, 1986). A detailed summary discussion of the fauna and species lists for the combined Sanctuaries is given in Nakahasathien & Stewart-Cox (1990).

CONSERVATION VALUE

Thungyai-Huai Kha Khaeng Wildlife Sanctuary is one of the outstanding conservation areas of south-east Asia because of its large, pristine and well protected primeval forest, which contains a unique savanna forest in Thungyai and undisturbed examples of almost all the principal inland forests of mainland southeast Asia. This occurs in an area of great variety, in topography, altitude, rainfall and soils, resulting in a very rich mosaic of habitats. The Sanctuaries protect the single largest block of the region's seasonal dry tropical forest, a biome which is very susceptible to fire and so widely converted to cultivation that it is more critically endangered than equatorial rainforests. The area surrounding it is large and unfragmented enough to sustain indefinitely natural communities with populations of large herbivores and predator species. It is a key site for both lowland and montane bird species, and, within the largest and least disturbed expanse of riverine forest in Thailand, for the country's last viable populations of several riparian birds (Round, 1988). It is considered the only conservation area in the country large enough to ensure the long-term survival of gaur and banteng (Brockelman, 1987).

Being in a transition zone between the tropics and sub-tropics and perhaps because it was a Pleistocene refugium, several species of birds and mammals of different biogeographic provinces are here sympatric. It is also one of the best modern examples of the impact of the Pleistocene epoch on the distribution and dispersal of southeast Asian fauna. Its importance to science as a conservation

area lies in the heterogeneity and integrity of its habitats, the very high biological diversity of its flora, and the complexity of its ecosystems. It is also of exceptional natural beauty, and watershed protection by its forests was estimated to be annually worth some US\$ 13.8 million (Dobias *et al.*, 1988). The Park lies within a Conservation International-designated Conservation Hotspot, a WWF Global 200 Eco-region, and a WWF/IUCN Centre of Plant Diversity. It is also an ASEAN Heritage Park.

CULTURAL HERITAGE

Thungyai contains several sites of great archaeological interest, possibly dating back to the Pleistocene era when early hominids are thought to have migrated east and southwards through the area. Stone artifacts have been found which reinforce this supposition, but the area has yet to be properly investigated (B.Stewart-Cox, pers. comm.). In Huai Kha Khaeng stone rings placed to mark the site of buried treasures, are common in some parts of the Sanctuary (as near the Sap Far Pa Guard Station), but none has been investigated by archaeologists. There may also be sites of interest to palaeo-anthropologists.

LOCAL HUMAN POPULATION

There are no longer any hill-tribe villages within the Huai Kha Khaeng Sanctuary, following relocation of the population in the 15 years before designation of the site. Some 3,800 tribal people lived within Thungyai Sanctuary when the site was designated. Karen tribesmen had been established in the area for at least 50 years and sixteen Karen villages (1,826 people) were still resident when the site was designated, though there were plans to resettle them. Hmong tribesmen are said to have moved in from further north 20-30 years ago and there still remained four Hmong villages in the east and north-east in 1987. Since then they have been relocated and by 1991 all their villages were closed down. Several Thai villages were recently established in the proposed buffer zone around both Sanctuaries, each group cultivating crops nearby. These may also be resettled eventually (Nakahasithien & Stewart-Cox, 1990).

VISITORS AND VISITOR FACILITIES

Neither Sanctuary is open to the general public, but permission to visit may be given to researchers, naturalists and student groups for specific purposes. General tourism, though confined to fairly small areas, is thriving. In 1991 about 1,000 visitors come to Huai Kha Khaeng and some 400-500 to Thungyai during the dry season. But one recent figure quoted by a visitor to the popular Huai Kha Khaeng Park was an annual total of about 570,000 (B. Bomhard, pers. comm., 2009). Permits can be obtained from the Wildlife Conservation Division in Bangkok, from the Sanctuary Superintendants and, for Huai Kha Khaeng, from the Head of Khao Nang Rum Research Station. A World Heritage Center and a Nature Education Center have been built there. Three nature trails in Huai Kha Khaeng and one in Thungyai have been constructed (RFD, 2002). Huai Kha Khaeng is accessible from Bangkok in 6-7 hours via Uthai Thani. As far as Lansak the road is metalled, but thereafter a four-wheel drive vehicle is often necessary. The journey to Thungyai by mostly unsurfaced road from Bangkok via Kanchanaburi takes 10-12 hours. A four-wheel drive road passes through the Sanctuary from the headquarters to a mining concession on the international border. There are buses from Bangkok to Uthai Thani and Lansak, but no public service as far as the Sanctuary.

SCIENTIFIC RESEARCH AND FACILITIES

The Sanctuaries are the prime biological and ecological research site in Thailand. Because so many communities coexist in such undisturbed conditions they are a key area for studying ecological interrelationships both terrestrial and aquatic. The Wildlife Conservation Division maintains a wildlife research station in Huai Kha Khaeng at Khao Nang Rum where a guest house is available. More than 50 projects have been carried out in the Sanctuary, about 20 projects involving fieldwork periods of six months or more (Nakahasithien & Stewart-Cox, 1990). Studies and surveys have included the identification of key elephant areas (Storer, 1979), bird communities (Round, 1988; Bhumpakkapan *et al.*, 1984); also work on the forests, green peafowl, felids, tapirs, gaur, turtles, salt licks, the effects of fire and of local villagers. A bibliography of 146 papers relating to field work undertaken in the Sanctuaries, chiefly Huai Kha Khaeng, is given in RFD (2002). Much less scientific research has been

undertaken in Thungyai where there are no facilities as yet. More research is needed to improve management practices and participation in them by local people.

MANAGEMENT

Management plans were prepared by a team from Kasetsart University (Kutintara & Bhumpakkapun), for Huai Kha Khaeng in 1988 and for Thungyai in 1989 which were approved by the Royal Forest Department's Management Plan Committee. At present the Sanctuaries form part of Thailand's Western Forest Complex of eleven national parks, including 2 proposed parks, and 6 wildlife sanctuaries, covering an area of 1,873,000 ha. A Western Forest Complex Ecosystem Management Program (WEFCOM) has been launched with the help of the Government of Denmark. With the participation of provincial conservation fora this will treat the whole World Heritage site as one ecosystem, within and including the extensive surrounding protected areas (RFD, 2002). It was also proposed in 1990 to enlarge the sanctuary by incorporating a further 17,500ha into the north-east of Huai Kha Khaeng to improve the management security of a deeply indented boundary near the headquarters. This would make more of the Sanctuary contiguous with Mae Wong National Park and incorporate the watershed slopes of the Huai Thap Salao and Huai Mae Dee Noi, the last remaining pockets of forest to the east of the Sanctuary (Nakahasithien & Stewart-Cox, 1990).

A World Heritage Center has been built and for Huai Kha Khaeng there are now 21 guard stations, and in Thungyai, 23 guard stations. In each area there is a commitment to reduce the area of sanctuary per guard station to 64 sq.km, even in the remote north, although at present, remoteness and difficulty of access are its main safeguards. Five forest fire protection units were established between 1999 and 2001 and a ranger station is proposed for Thungyai. Monitoring is spotty outside the central zone of Huai Kha Khaeng. It has been carried out on large mammals, on forest succession around former Hmong villages, on forest reduction around Karen villages, and on villages in the buffer zone. This zone is managed by a committee of government officials, NGOs and local people to increase local awareness of conservation and to promote the people's quality of life. It is considered important to foster good relations with these communities and there is even an annual local World Heritage Day to promote the sites (RFD, 2002). There is regular monitoring of large mammals, forests around the Karen villages and households.

MANAGEMENT CONSTRAINTS

Huai Kha Khaeng Sanctuary has been far from secure, especially on its eastern edge. Aggressive poaching is a persistent problem, and agricultural development, logging and dam projects to the east and south have facilitated access to poachers. The construction of the Thap Salao Dam to the east deforested much of the buffer zone. Encroachment increased with the construction of the Sri Nakarin and Khao Laem dams to the south and EGAT's illegal road to the proposed Nam Choan Dam site. The greatest threat was from this proposed dam, a project revived by the Electricity Generating Authority (EGAT) which would have flooded 75km of the valleys of the upper Kwae Yai. There was fierce opposition from wildlife conservationists because its reservoir would have split the sanctuary into three smaller areas and greatly reduced the long-term survival prospects of the larger mammals and would flood riverine habitat below 380m (Brockelman, 1987). Such lowland forest, especially lowland riverine forest, is already rare in Thailand and poorly represented in the protected areas system (Brockelman, 1987). Several threatened species occur almost exclusively in this kind of habitat, for example short-clawed otter, smooth-coated otter, green peafowl, lesser fish eagle, white-winged wood duck and red-headed vulture, as well as many uncommon plants. Valley bottom habitats, such as the Mae Chan valley which would be flooded, provide optimal habitats for most of the large herbivores, such as tapir, elephant and wild cattle. Although this dam project was shelved in 1988, it could be revived in the future. Other problems which are chronic but not seriously threatening are encroachment for livestock rearing, sandalwood logging, forest produce collecting, fire and illegal mining. Long-term threats are an increase in the number of Karen villages in Thungyai, and more frequent poaching and resource collection.

STAFF

The staff numbered 551 in 2002: 16 graduate Forest officers, 40 rangers and 495 temporary employees, in 44 ranger stations and 5 forest fire protection units. Training courses were arranged by WEFCOM and the Wildlife Conservation Division; between 2000 and 2002 there were four, usually abroad, attended by 59 Forest Officers, and seven national courses for 859 rangers and temporary staff (RFD, 2002).

BUDGET

The annual allocation for the Sanctuaries between 1997 and 2002 ranged between US\$0.8 and US\$1.53million, averaging US\$773,900 per year, excluding new building construction costs (RFD, 2002). WHF granted US\$20,000 in 1998, for technical assistance.

LOCAL ADDRESSES

The Director-General, Royal Forest Department, 61, Phaholyothin Road, Chatuchak, Bangkok 10900, Thailand.

The Superintendent, Huai Kha Khaeng Wildlife Sanctuary, PO Box 7, Lansak District, Uthai Thani Province 61160, Thailand.

The Superintendent, Thungyai-Naresuen Wildlife Sanctuary, Kanchanburi Forest Office,

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