

ASIA / PACIFIC

DONG PHAYAYEN-KHAO YAI FOREST COMPLEX

THAILAND



WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

DONG PHAYAYEN-KHAO YAI FOREST COMPLEX (THAILAND) ID N° 590 Rev

Background Note:

In 1991 the Government of Thailand nominated Khao Yai National Park (NP) to the World Heritage (WH) List. The nomination was deferred by the 15th Session of the WH Bureau and the government was requested to:

- a) “provide a better assessment of the Park’s international significance;
- b) elaborate the site’s potential links with adjacent parks with a view to increasing the size of the nominated area; and
- c) clarify their intention with regard to the construction of dams within the Park boundaries.”

Since 1991 the State Party has included Khao Yai NP within a complex with three other national parks and a wildlife sanctuary, with one of the national parks and the wildlife sanctuary established as recently as 1996, to form the Dong Phrayayen-Khao Yai Forest Complex (DPKY-FC). This nomination of the DPKY-FC is therefore a response to the deferral of 1991.

1. DOCUMENTATION

- i) **Date nomination received by IUCN:** April 2004
- ii) **Dates on which any additional information was officially requested from and provided by the State Party:** IUCN requested supplementary information on the 6 November 2004, after the field mission, and 10 January 2005, after the IUCN WH Panel. State Party responses were received on 30 November 2004 and 11 March 2005 respectively.
- iii) **IUCN/WCMC Data Sheet:** 60 references in the nomination document.
- iv) **Additional Literature Consulted:** Department National Parks, Wildlife and Plant Conservation (2004) **GIS Database and its Applications for Ecosystem Management - WEFKOM Ecosystem Management Project**; C. Magin and S. Chape (2004) **Review of the World Heritage Network: Biogeography, Habitats and Biodiversity**; S. Chettamart (2003) **Ecotourism Resources and Management in Thailand**; J. Parr (2003) **A Guide to the Large Mammals of Thailand** (Sarakadee Press, Bangkok); A. Lynam (2003) **A National Tiger Action Plan for the Union of Myanmar**; J. MacKinnon (1997) **Protected Area Systems Review of the Indo-Malayan Realm**.
- v) **Consultations:** 7 external reviewers. Superintendents and staff of Khao Yai, Thap Lan, Pang Sida and Ta Phraya National Parks, and Dong Yai Wildlife Sanctuary; 2 consultation meetings were held: with the Department of National Parks, Wildlife and Plant Conservation, and the Office of Natural Resources and Environmental Policy and Planning in Bangkok, and with local stakeholders at Pang Sida NP; and superintendent and staff of Huai Kha Khaeng Wildlife Sanctuary WH Site.
- vi) **Field Visit:** Stuart Chape, 19-28 October 2004.
- vii) **Date of IUCN approval of this report:** April 2005

2. MAIN FEATURES AND SUMMARY OF NATURAL VALUES

The Dong Phrayayen-Khao Yai Forest Complex (DPKY) lies in an east-west alignment along and below the Korat Plateau, the southern edge of which is formed by the Phanom Dongrek escarpment. This places the complex inside the Udvardy (1975) Thaiandian Monsoon Forest biogeographic province, bordering the Indochinese Rainforest biogeographic province; modified by MacKinnon (1997) to the Central Indochina and Cardamom Mountains biogeographic units, respectively. The complex also lies at the edge of WWF Global 200 Ecoregion 35 (Tropical and Subtropical Moist Broadleaf Forest) and Ecoregion 54 (Indochina Dry Forests). The Cardamom Mountains biogeographic unit also

corresponds to a Conservation International biogeographic hotspot.

The complex comprises five almost contiguous protected areas spanning 230km between Ta Phraya NP on the Cambodian border in the east, and Khao Yai NP at the west end of the complex. Khao Yai is the only mountainous section, with an elevational range between 100-1351m. It is rugged with a steep south-facing scarp, at places 500m high, which dips back gently to the north, and slopes gradually down over the southeast half of the site. About 7,500ha lies above 1000m. The north side is drained by several tributaries into the Mun River, a tributary of the Mekong River. The southern side is drained via numerous scenic waterfalls and gorges by four main fast-flowing streams into the Prachinburi River.

Thap Lan NP to its east has an elevational range of 100-992m with much of its area lying between 300-500m and draining mainly north to the Mun river. Pang Sida NP lies to the south of Thap Lan NP across a watershed ridge, sloping south. It lies between 70-849m with part of the broad Phanom Dongrak escarpment at its western end. The Ta Phraya NP (120-562m) extends to the east, with north-draining uplands between 280-300m, which

fall in a 200m scarp to the lowland valley of the Lam Sathorn River to the east. Lying between the last three areas and connecting them all is the low hilly Dong Yai Sanctuary (230-685m) which has a small outlier to its east adjacent to Ta Phraya NP. The total area of the complex, excluding any buffer areas outside of protected area boundaries, is 615,500ha. The details are included in Table 1.

Table 1: The details of the protected areas included in the nominated serial property

Protected Area Name	Year Est.	Area (ha)	IUCN PA Management Category	Other Existing Designation
Khao Yai NP	1962	216,800	II	ASEAN Heritage Park
Thap Lan NP	1981	223,600	II	
Pang Sida NP	1982	84,400	II	
Ta Phraya NP	1996	58,400	Unassigned	
Dong Yai WS	1996	31,300	Unassigned	

The rugged western half of Khao Yai NP lies on Permo-Triassic igneous volcanic rocks. To the south and east this is replaced by Jurassic calcareous and micaceous siltstones and sandstones. In the northwest part of Khao Yai there are small areas of limestone karst with steep cliffs, gorges, columns and caves. All of Thap Lan, as far as upland Ta Phraya, forms the rim of the quartz-rich sandstone Korat Plateau, the edge of which is the Phanom Dongrek range and escarpment. Formation of the Phanom Dongrek escarpment is attributed to crustal uptilting.

Annual rainfall over the complex ranges from 3000mm in the west to under 1000mm in the east, mainly during the southwest monsoon between May and October. Higher elevations and south-facing slopes, in common with the rest of Thailand's lower central plains, receive more rain. Khao Yai NP is the wettest area, averaging 2270mm per annum. There is a long dry season between November to April when moist evergreen forests retain their humidity but which favours the growth of dry open forest towards the east.

The complex has a well defined topographic, climatic and vegetation east-west gradient. It contains all major habitat types of eastern Thailand and at least 2500 plant species are recorded (16 endemic) of the 20,000-25,000 species estimated for Thailand (MacKinnon 1997). Within the area three main types of vegetation are dominant: evergreen forests (73.8% of all five reserves), mixed dipterocarp/deciduous forest (5.3%) and deforested scrub, grassland and secondary growth (18%). The first two categories, with karst and riverine ecosystems, comprise the most significant habitats. The evergreen forests are of three types: dry (28.7%), moist evergreen above 600m (25.8%) and hill and lower montane rainforests (19.3%). They provide a wide range of ecosystems and habitats. The dipterocarp/deciduous mixed forests provide a similarly wide range but in drier fire-prone areas with sandy soils. As well as mixed

forests the drier areas include dry dipterocarp forest and grassland. The small area of karst in the northwest of Khao Yai NP has distinctive microhabitats. Riverine ecosystems wind through other forest types, with distinct features and limited habitats such as cascades, waterfalls and deep pools.

More than 80% of Khao Yai NP is covered in evergreen or semi-evergreen forest, much of it tall, good quality primary forest. Moist and dry evergreen forests also occur in the other protected areas of the complex: Thap Lan 59%, Pang Sida 86.5%, Ta Phraya 72.5%, and Dong Yai 70.6%. A greater proportion (32%) of Thap Lan has been degraded, mostly through loss of dry dipterocarp forest by clearing for agriculture and tree plantations in the northern and northwestern sections. However, it also has about 700ha of the fan-leaved corypha or *lan* palm, on the leaves of which Buddhist sermons were originally inscribed. Pang Sida has wide south-facing hill-slope habitats. There are also extensive areas of bamboo forest. In Ta Phraya 25% and in Dong-Yai almost 20% of the land is grassland or scrub. The protected areas in the DPKY complex were logged to a varying extent prior to the declaration of the 1989 logging ban by the Thailand Government, with secondary regrowth forest succession evident in many areas. Nevertheless, there are significant core areas of primary forest in all protected areas of the complex, as evidenced in a low altitude overflight during the evaluation mission.

The complex contains more than 800 fauna species, and protects some of the largest remaining populations in the region of many important wildlife species. A total of 112 species of mammals are known from the four parks: in Khao Yai - 72 species, Thap Lan - 76, Pang Sida - 85 and Ta Phraya - 21. Complete data are not yet available for Dong Yai but the wildlife sanctuary is known to contain important large mammal species. Globally threatened mammals found in the complex include the

Asian Elephant (EN), Tiger (EN), Leopard Cat (EN), Clouded Leopard (VU), Marbled Cat (VU), Asian Golden Cat (VU), Pigtailed Macaque (VU), Stump-tailed Macaque (VU), Pileated Gibbon (VU), Asiatic Black Bear (VU), Malayan Sun Bear (VU), Asiatic Wild Dog (VU), Large Spotted Civet (VU), Malayan Porcupine (VU), Wild Pig (VU), Serow (VU), Banteng (EN) and Gaur (VU). The karst area has endemic species of reptiles and bats (63 reptile species are recorded in Khao Yai). Important riverine species include the Smooth-coated Otter (VU) and the endangered Siamese Crocodile (CR), rediscovered in Pang Sida NP in 1992. The Department of National Parks, Wildlife and Plant Conservation (DNPWPC) is currently implementing a scientifically controlled crocodile re-introduction programme in Pang Sida NP in collaboration with Mahidol and Kasetsart Universities. Khao Yai NP is scientifically important at a global scale, as it is the only known location where White-handed and Pileated Gibbon species have overlapping ranges and interbreed.

Other notable species found in the complex include: Long-tailed Macaque, Silvered Langur, White-handed Gibbon, Slow Loris, Malayan Pangolin, Black Giant Squirrel, Hairy-footed Flying Squirrel, Whitehead's Rat, Brush-tailed Porcupine, Palm Civet, Binturong, Marbled Cat, Jungle Cat and Leopard. There are also unconfirmed reports of Wild Water Buffalo (EN). Recent surveys of herpetofauna indicate more than 200 species of reptiles and amphibians, with nine endemic species.

A total of 392 species of birds have been recorded within the DPKY-FC: Khao Yai - 358 species, Thap Lan - 284, Pang Sida - 238 and Ta Phraya - 200. The complex provides resident habitat for three globally threatened bird species: Pale-capped Pigeon (VU) and Silver Oriole (VU) (evergreen forest), Green Peafowl (VU) (dipterocarp/deciduous forest) and Masked Finfoot (VU) (riverine habitat). In addition, 53 species considered nationally threatened or near threatened occur including four species of hornbill. Some 12.5% of birds are vagrant or passage migrants, including the Spot-billed Pelican (VU) and Greater Adjutant (CR).

3. COMPARISONS WITH OTHER AREAS

Thailand has 82 terrestrial national parks and 55 wildlife sanctuaries. Of these, 17 protected area complexes have been identified as important for large mammal conservation (Parr 2003), including DPKY-FC, which at 6,155 km², is the second largest forest complex in Thailand and the fourth largest in the region. The largest complex in Thailand is the Western Forest Complex (WEFCOM), comprised of 17 protected areas covering 18,730 km² and located in the Indochinese Rainforest biogeographic province biogeographic unit. The Huai Kha Khaeng-Thung Yai (HKK-TY) Wildlife Sanctuaries WH property forms the core of this huge area, and presents a logical point of comparison with the DPKY-FC nomination. A comparison with HKK-TY was central to the evaluation of the 1991 Khao Yai nomination. A field visit to HKK Wildlife Sanctuaries and extensive overflight of both HKK and TY was carried out following the evaluation of the DPKY complex nomination.

With the addition of Thap Lan, Pang Sida and Ta Phraya NPs, and the Dong Yai Wildlife Sanctuary, the concern of

the 1991 Khao Yai evaluation regarding the size of the area has to a large extent been addressed - provided that effective wildlife corridors are constructed to ensure connectivity. The DPKY-FC is known to protect representative populations of most of the large mammal species of Thailand and has an intact carnivore community (reviewer comment). The overall species count (relative to HKK-TY and other complexes) has increased significantly from the nomination of Khao Yai in 1991. The largest contiguous area within the complex (Thap Lan, Pang Sida, Dong Yai and Ta Phraya) covers almost 3,500 km². However, apart from Khao Yai, all areas show impacts from logging (prior to the Government of Thailand 1989 logging ban), and other anthropogenic impacts. Nevertheless, even HKK-TY has had historic and ongoing anthropogenic impacts in some areas as a result of past human habitation and clearing of vegetation. Overall, DPKY presents a complex mosaic of all vegetation/habitat types remaining in northeast Thailand, including rainforest habitats; reflecting not only successional processes but also resulting from landform and soil diversity, and the east-west climatic gradient that characterises the complex. DPKY-FC Khao Yai NP contains a significant area of hill evergreen forest (39% of total KY NP area) above 600m altitude. Table 2 compares the DPKY-FC to other relevant WH properties and protected areas in the Indo-Malayan Realm.

The comparative examples given below are a mix of protected area remnant 'islands' in modified landscapes and those that are part of larger natural landscapes. The WEFCOM is the most outstanding example of the latter, not only a huge area in its own right but also (currently) functionally linked to large natural ecosystems in Myanmar. The smaller Kaeng Krachan complex also has ecological linkages with Myanmar. The Laos example is within the larger Annamite Mountains forested ecosystems on both sides of the Laos-Vietnam border, including linkages to Phong Nha-Ke Bang WH property. The DPKY-FC falls into the former category, and is the last substantial remnant habitat in northeastern Thailand capable of sustaining viable populations of large fauna. In terms of fauna biodiversity values, the DPKY complex compares favourably with both existing WH properties and other protected areas in the region. In particular, its suite of mammal species includes populations of the globally endangered tiger and elephant. Actual numbers of tiger are currently unknown but all protected areas report sightings/tracks, although it appears unclear whether or not tigers remain in Khao Yai NP. The elephant population in the complex is estimated to be about 300 animals.

Properties in other countries in the region, including Laos, Cambodia and Myanmar have greater apparent habitat integrity but also greater problems with regard to poaching and wildlife trade, and major management capacity issues. (There is, nevertheless, great potential in these countries). For example, a recent survey report by the Wildlife Conservation Society (Lynam 2003) on the status of tigers in Myanmar concluded that "the tiger in Myanmar has suffered a range collapse and is in an advanced state of decline towards extinction". The survey compared the status of tigers in Thailand, noting that conservation in that country was more successful as a result of protected area establishment and management, even though "both countries had similar richness and abundance of [other] large mammals".

Table 2: Comparison of the nominated property to other WH properties and protected areas in the Indo-Malayan Realm

PA/PA Complex	Area (rounded km ²)	Mammals	Birds	Reptiles & Amphibians	Biogeographic Province	Human Impact
DPKY	6,155	112	392	200	Thailandian Monsoon Forest	Old logging, agriculture, poaching, roads
Thung Yai-Huai Kha Khaeng WHS, Thailand	6,222	120	400	139	Indochinese Rainforest	Some habitation, agriculture
Phong Nha-Ke Bang WHS, Vietnam	858	113	302	81	Indochinese Rainforest	Roads, poaching, cultivation
Kaziranga NP WHS, India	378	35 (*Indian Rhinoceros)	300	?	Burma Monsoon Forest	Poaching, incursions
Manas NP WHS, India	520	55	450	53	Burma Monsoon Forest	Poaching, incursions, separatist conflict
Sinharaja Forest Reserve WHS, Sri Lanka	87	38	147	60	Ceylonese Rainforest	Old logging, poaching, incursions
Tropical Rainforest Heritage of Sumatra WHS	26,000	180	450	?	Sumatra	Illegal logging, agriculture, settlements and roads
Western Forest Complex (including TY-HKK WHS)	18,730	150	490	130	Indochinese Rainforest	Poaching, refugees agriculture, proposed road development
Kaeng Krachan Forest Complex	4,373	57	400	?	Indochinese Rainforest	Poaching, incursions
Nakai-Nam Theun National Protected Area, Laos	3,445	Important representation of major species found in Indochina, including CR, EN and VU mammal species and 400 bird species			Thailandian Monsoon Forest/ Indochinese Rainforest	High level of poaching for wildlife trade, incursions
Cardamom Mtns, Cambodia	14,500 (several scattered PAs)	+100	450	?	Indochinese Rainforest	High level of poaching, wildlife trade, logging

In relation to Criterion (iv), on a comparative basis the DPKY-FC is clearly of global significance with regard to wildlife conservation. It also contains important core areas of relatively unmodified habitat representative of globally important tropical forest ecosystems. The DPKY-FC is located within the Udvardy Thailandian Monsoon Forest biogeographical province and contains elements of the WWF Cardamom Mountains Rainforest Ecoregion, which currently do not have a WH property (Magin and Chape 2004). However, in relation to Criteria (i), (ii) and (iii), the DPKY-FC does not have features that meet or surpass values in other areas at international scales. Nominated under Criterion (i), the escarpment feature is similar to a number of locations and also extends beyond the nominated area as a regional feature. With regard to Criterion (ii), while the area contains valuable habitats and ecosystems, and plays a key role in local, national and regional hydrological and ecological processes, these do not constitute global values. By comparison, Thung Yai-Huai Kha Khaeng WH property,

especially within the larger WEFKOM, protects huge contiguous areas of tropical forest ecosystems. The protected areas in Laos along the Annamite Range protect a much larger proportion of the catchment inflow of the Mekong Basin. Similarly, with regard to Criterion (iii), while the DPKY-FC does contain landscapes and species that represent a “significant aesthetic experience”, many of which are accessible in Khao Yai NP, the scale of such experiences is met or exceeded in other WH properties and protected areas.

4. INTEGRITY

4.1. Legal Status

The protected areas are the property of the Government of Thailand, with the four national parks declared under the National Parks Act of 1961 and the Dong Yai Wildlife Sanctuary declared under the Wild Animals Reservation

Protection Act 1960 (amended 1992). The Department of National Parks, Wildlife and Plant Conservation (DNPWPC), through the Office of National Parks (ONP) in the Division of Plant Conservation and Protection and the Office of Wildlife Conservation (OWC) within the Division of Laws, administer both national parks and wildlife sanctuaries respectively. Both national park and wildlife laws provide sufficient legal protection but each has distinct management objectives or primary emphases that have required operational clarification by the managing agencies. The National Parks Act states that a national park is established to “preserve its natural state for the benefit of public education and enjoyment”, placing a strong emphasis on human use rather than conservation. Therefore guiding principles have been established for national parks that refer to preserving and maintaining “ecosystem integrity, biodiversity and scenic beauty” (Chettamart 2003). The OWC has also developed objectives that refer to providing “opportunities for the public to learn and enjoy the areas”. Nevertheless, the fundamental differences in the objectives of the supporting legislation, as well as the division of administrative responsibilities between two agencies within the DNPWPC emphasise the importance of collaborative management approaches and harmonised objectives. In the case of WH properties the State Party could consider development of specific national WH legislation to ensure a more coherent and integrated approach to manage of WH properties.

Table 3: Staffing levels in the nominated property

Category	Khao Yai	Thap Lan	Pang Sida	Ta Phraya	Dong Yai	Total
Professional	9	5	6	3	3	26
Permanent employees	68	18	21	7	8	122
Seasonal employees	305	211	135	49	56	756
Total	305	211	135	59	67	904

The evaluation mission supported the view of the nomination document that “present levels of coordination within the complex are not optimal”. Geographically contiguous areas are administratively separated, each with a superintendent-in-charge. The rationale for establishing the administratively and legislatively separate, but in part ecologically contiguous, Dong Yai WS was also not apparent during the field evaluation. It creates perceptual and managerial boundaries, when in fact the whole area needs to be managed as a cohesive unit. This would be greatly assisted through a ‘whole-of-complex’ management approach (as in the WEFCON Ecosystem Management Project) directed by a ‘chief superintendent’ responsible for overall management coordination and budget allocation, with an appropriate level of seniority and professional expertise. The supplementary information provided by the State Party in March 2005 states that a forest complex Manager will be appointed in 2006 after the completion of a new management plan (see below).

The existing legislation has been criticised for precluding “involvement of local communities in protected area management issues” and that “the National Parks Division and the Wildlife Conservation Division place heavy emphasis on law enforcement, in line with the legal framework” (WWF Thailand website). Discussions with park staff and stakeholders during the evaluation mission suggested that this approach is changing. A recent collaborative initiative in Khao-Yai NP, the Khao Yai Conservation Project involving a range of stakeholders, provides a good example that could be replicated in other parts of the complex.

4.2 Management

All the protected areas in the DPKY-FC have full-time resident staff, including superintendents for each area. There are 80 ranger stations located around and in the complex. Basic management capacity at non-professional levels is adequate by international standards and good by regional levels. This is particularly the case relative to the neighbouring high biodiversity countries of Laos and Cambodia. However, the level of professional (tertiary trained) staffing needs strengthening in all of the protected areas in the complex, especially in Thap Lan NP the largest protected area, but also in Ta Phraya NP with its cross-border issues – which also needs strengthening of its ranger staff for the same reason, although police also patrol the border area. The nomination document lists staffing levels as noted in Table 3.

Three of the five protected areas have operational management plans. Plans for the most recently established areas, Ta Phraya NP and Dong Yai WS, are scheduled to be prepared in 2004. As well as the individual operational plans, a strategic management plan for the entire complex was prepared by the Office of Environmental Planning and Policy and Kasetsart University in 1997. This plan was updated by the Office of National Parks and Kasetsart University in 2004. It is essential that the plan move from strategic intent to coordinated action as soon as possible. However, in its supplementary information the State Party has indicated that a further management plan for the whole complex will be prepared by a private company, contracted in June 2004. The relationship to the existing plan is not clear, nor the rationale in appointing the complex manager after the new plan has been completed. It would be helpful if the complex manager participated in development of the new plan.

While budgets for Thap Lan and Pang Sida remained fairly constant between 1998-2003, they increased for Khao Yai NP and declined for Ta Phraya NP and Dong Yai WS (both received 11% of the funds provided to Khao Yai in 2003). Khao Yai NP is the primary visitor attraction in the complex, not surprising given its proximity to the national capital, role as Thailand's first national park, its place in the national psyche as a symbol of nature conservation, and promotion as a tourist centre. The park received more than half a million visitors in 2003 and has well established visitor facilities that require high maintenance levels and therefore the need for significant funding is understood. In contrast, Ta Phraya NP received only 280 visitors in 2003, down from a peak of 2,720 in 1999. The reasons for this significant decline are not entirely clear but the border area is less accessible, there are fewer facilities and security issues. However, it is evident that there is a substantial disparity in financial resourcing across the complex, reflected in lower levels of staffing and equipment in the eastern protected areas, that needs to be corrected.

4.3 Boundaries

The boundaries of the DPKY-FC follow contour lines and were originally drawn around remaining areas of forest and natural habitat, in common with many of the world's protected areas. This has resulted in a complicated boundary, especially on the northern side of Thap Lan NP and almost the entire area of Ta Phraya NP. Ta Phraya also has a high boundary to area ratio, protecting the remaining linear stretch of forest along the Thai-Cambodian border, increasing management difficulty. In some areas significant incursion and agricultural conversion has occurred, especially in the north and northwest part of Thap Lan NP. There is no clear external buffer zone delineation, with other land uses bordering directly onto the protected areas. The exception is part of the northern boundary of Thap Lan NP, which borders with the Sakaraet Biosphere Reserve, administered by the Ministry of Science and Technology. There is a need to rationalise the complex boundaries and this has been recognised by the Government. In its supplementary information the State Party has committed to boundary adjustment by 2007, with the exclusion of 437.73km² of inhabited and degraded land and the addition of 176.27km² of National Forest Reserve to Thap Lan. The successful reforestation at Khao Pheng Ma, on the northeast border of Khao Yai, undertaken by WWF Thailand is an excellent example of what can be achieved to re-establish natural forest, and this approach should be replicated in buffer zones.

4.4 Human Impact

As the last major area of extensive forest in northeastern Thailand, surrounded by almost completely converted landscapes, human pressures are significant and diverse:

Roads

Major roads divide the complex between Khao Yai NP and Thap Lan NP (Road 304), and separate Dong Yai WS and Ta Phraya NP (Road 348) and currently limit the effectiveness of the complex for ecosystem scale conservation and wildlife protection. Road 304 presents

a particular problem because it is a busy highway that separates Khao Yai and Thap Lan. Nevertheless, the Government recognises the problem and has undertaken to develop wildlife corridors at two points along Road 304 and one on Road 348 where natural vegetation and topography offer opportunities to do so. The Government has budgeted 20 million Thai Baht (approximately US\$500,000) to undertake a feasibility study for development of these corridors (State Party supplementary information November 2004). However, in the supplementary information provided in March 2005, the State Party advised that the feasibility study would commence in 2006, take 2 years, followed by a construction period of 5 years, with completion in 2013. IUCN is concerned, however, that this 8 year time frame currently proposed by the State Party to complete the design and construction of the corridors will compromise the values of the complex. IUCN considers that the viability of the complex retaining outstanding universal value is highly dependent on re-establishing and maintaining connectivity between different ecological components of the complex currently compromised by the roads. Ecologically effective wildlife corridors will be an essential part of the strategy to ensure connectivity within the complex but the process to construct these corridors must be expedited.

Although the State Party's supplementary advice states that the ecological suitability of various construction methods will be assessed, it also indicates that "at this point, it appears that the corridors will be in the form of a wildlife underpass". It is important that all options are considered. Underpasses are unlikely to encourage movement between protected areas of larger mammals and the State Party should evaluate the construction of "green or ecological bridges" over the roads. Such bridges have been used successfully in a number of countries (e.g. Banff National Park in Canada).

Two other north-south roads (Road 3462 in Pang Sida-Thap Lan and Road 3308 in Ta Phraya) have already been closed to public through-traffic, with Road 3462 used only for tourist entry into Pang Sida NP.

Incursions, Conversion and Separation

The DPKY-FC is located in an economically poorer part of Thailand and significant areas on the northern and northwestern periphery of Thap Lan NP have been taken over in past years and converted to agriculture. A number of villages are still located in the northeastern section of Thap Lan. As noted above, action needs to be taken to rationalise boundaries and establish effective buffer zones in collaboration with local communities. Pang Sida NP has a number of community groups that actively support the park and this needs to be replicated in all areas.

Between Khao Yai NP and Thap Lan NP there is a significant area of developed agricultural land separating the two national parks either side of Road 304. This area needs to be carefully managed as a buffer zone in conjunction with construction of wildlife corridors to the north and the south of this area. Planning controls need to be applied to the types of development permitted in this area.

Tourism

Of the four national parks in the complex, Khao Yai receives the most pressure from tourism. At peak times the carrying capacity of the park is exceeded, placing intense pressure on management and facilities. Ongoing concerns relate to use of the main north-south park road, in particular the impact on wildlife and the significant number of road kills. Speed bumps were recently installed and have had some effect. However, other strategies will need to be considered to bring people into the park, and setting limits on the numbers of people allowed entry. Some tourist activities occur in other parts of the complex, especially in Pang Sida NP, and a whole-of-complex tourism strategy needs to be developed and implemented to deal with increasing pressures and opportunities.

Poaching

Although park staff report a drop in illegal hunting and poaching activities as a result of increased patrolling activities, this remains an issue (as it is in all protected areas in the region, including TY-HKK WH property). As well as wildlife poaching, the high value wood *Aquilaria crassna*, used to produce incense for Middle East markets, is also illegally taken from the park. Cambodian small-scale loggers are known to occasionally cross the border into Ta Phraya NP to take timber. Additional resources are required to ensure that park staff can adequately deal with these threats, including additional staff trained in community participatory management processes.

4.5 Other Threats

The eastern protected areas, Dong Yai and Ta Phraya, contain unexploded ordinance, including land mines in Ta Phraya NP, as a result of the 1970s-1980s conflicts in Cambodia and insurgent activities in Thailand. These areas need to be thoroughly surveyed and cleared in places where management staff require access, and to provide for safe future public access.

5. ADDITIONAL COMMENTS

The Government of Thailand is to be commended for its efforts to conserve the country's natural heritage, especially through the designation of large areas and complexes, and its recent allocation of funding to develop a national protected areas system plan. This important initiative should ensure that all important habitats are not only effectively conserved but also linked to a range of management objectives that ensure community participation.

The IUCN evaluation mission also visited Thung Yai-Hua Kha Khaeng (TY-HKK) WH property in order to compare the current nomination with the existing property. It was observed that there appeared to be no active promotion of the WH status of TY-HKK at the property entrance. As a result of an extension to the original boundary, the WH inscription marker now lies 9 km inside the property. The State Party should consider a more active and visual promotion of the WH status of TY-HKK at the property entrance to increase local and visitor awareness of the WH values.

6. APPLICATION OF CRITERIA/STATEMENT OF SIGNIFICANCE

The Dong Phayayen-Khao Yai Forest Complex has been nominated under all four natural criteria.

Criterion (i): Earth's history and geological features

The Phanom Dongrek escarpment is a significant geomorphological feature of the DPKY-FC, especially within Ta Phraya NP along the Thailand-Cambodia border. However, although an important regional landscape feature it is not of outstanding universal value. IUCN does not consider that the nominated property meets this criterion.

Criterion (ii): Ecological processes

While acknowledging the key role that the DPKY-FC plays in local, national and regional hydrological and ecological processes there are other larger, more globally important properties that contribute to these values in the wider region. IUCN does not consider that the nominated property meets this criterion.

Criterion (iii): Superlative natural phenomena or natural beauty and aesthetic importance

The DPKY-FC contains landscapes of national and regional importance. It also contains species of international importance with high aesthetic value, many of which are visible in Khao Yai NP. However, the scale of the landscape aesthetic experience is met or exceeded in other WH properties and protected areas, including TY-HKK WH property, and the aesthetic interaction with wildlife, in terms of global experiences, is also exceeded in other properties. IUCN does not consider that the nominated property meets this criterion.

Criterion (iv): Biodiversity and threatened species

The DPKY-FC contains more than 800 fauna species, including 112 species of mammals, 392 species of birds and 200 reptiles and amphibians. It is internationally important for the conservation of globally threatened and endangered mammal, bird and reptile species that are recognised as being of outstanding universal value. This includes 1 critically endangered, 4 endangered and 19 vulnerable species. The complex contains the last substantial area of globally important tropical forest ecosystems of the Thai Monsoon Forest biogeographic province in northeast Thailand, which in turn can provide a viable area for the long-term survival of these globally important species. The unique overlap of the range of two species of gibbon, including the vulnerable Pileated Gibbon, further adds to the global value of the complex. IUCN considers that the nominated property meets this criterion.

7. DRAFT DECISION

IUCN recommends that the Committee adopt the following draft decision:

The World Heritage Committee,

1. Having examined Document WHC-05/29.COM/8B

2. Inscribes the Dong Phayayen-Khao Yai Forest Complex, Thailand, on the World Heritage List on the basis of natural criterion (iv).

Criterion (iv): The DPKY-FC contains more than 800 fauna species, including 112 species of mammals, 392 species of birds and 200 reptiles and amphibians. It is internationally important for the conservation of globally threatened and endangered mammal, bird and reptile species that are recognised as being of outstanding universal value. This includes 1 critically endangered, 4 endangered and 19 vulnerable species. The area contains the last substantial area of globally important tropical forest ecosystems of the Thai Monsoon Forest biogeographic province in northeast Thailand, which in turn can provide a viable area for the long-term survival of these globally important species. The unique overlap of the range of two species of gibbon, including the vulnerable Pileated Gibbon, further adds to the global value of the complex.

3. Requests the State Party to carry out a design study for the construction of ecologically effective wildlife corridors to functionally link the western and eastern sectors of the complex, and to report on its findings; as well as an implementation time table, to the 31st session of the World Heritage Committee in 2007;
4. Further recommends that the State Party:
- i) expedite the implementation of the Dong Phayayen-Khao Yai Forest Complex management planning and appoint a manager responsible for the entire PA complex
 - ii) provide increased resources for management across the complex;
 - iii) undertake comprehensive and ongoing wildlife status monitoring;
 - iv) implement measures to control the speed of traffic on the major roads that bisect the complex, especially before ecological corridors are constructed;
 - v) ensure that the World Heritage status of the complex is actively promoted to further encourage public cooperation in the conservation of the complex; and
 - vi) explore transboundary protected area cooperation with the Government of Cambodia with regard to Banteay Chmor Protected Landscape, as well as other transborder resource management issues that affect the DPKY-FC.
5. Commends the State Party for its establishment of protected area complexes to maximize conservation opportunities.

Map 1: General location of nominated property



Map 2: Boundaries of nominated property

