

PHU KHIEO WILDLIFE SANCTUARY PROJECT

[Thailand]

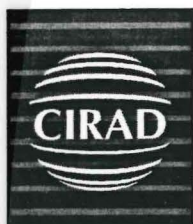
Report of the Expert on National Park Management June 1997

(Contribution to the final report)

Serge DARROZE (CIRAD-EMVT)

Rapport CIRAD-EMVT n° 97021

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PARIS

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1 BACKGROUND

1.1 THE WILDLIFE, NATIONAL PARK AND NATURAL RESOURCES SECTOR

Thailand possesses 108 terrestrial national parks and wildlife sanctuaries, for a total area of 6,892,256 hectares, or 13.41% of the land area of the country, plus 18 marine national parks, for 1,505,509 hectares. These protected areas are scattered all around the country:

REGION	NATIONAL PARKS		WILDLIFE SANCTUARIES	
	NUMBER	AREA (ha)	NUMBER	AREA (ha)
NORTH	25	1,505,509	15	1,412,774
NORTH-EAST	18	999,674	9	462,958
CENTRAL	11	821,845	7	706,978
SOUTH	10	384,294	13	598,224
TOTAL (excluding marine parks)	64	3,711,322	44	3,180,934
MARINE	18	1,505,509	0	0
TOTAL	82	5,216,831	44	3,180,934

However most of these areas have been and still are suffering serious conflicts with the increasing surrounding population in search for new agricultural land, either because of natural population increase, or due to the emigration from areas where poor management techniques have provoked a sterilization of the soils, mostly because of salinization or erosion.

Many of these areas are small (64 are less than 40,000 hectares), and are already heavily encroached and degraded. Although some are contiguous and form large protected ecosystems, most of these are scattered and separated by intensively used agricultural areas. Most species of large mammals are endangered because they cannot be sustained in small areas, and cause conflicts with local populations (e.g. elephants in the south).

1.2 KEY ISSUES TO WILDLIFE MANAGEMENT IN THAILAND AND IN THE REGION

Many animal and plant species are in the verge of extinction in Thailand and in South East Asia. Some species, although still on the lists of legally protected animals, are probably extinct in the country, like the Schomburgk's deer *Cervus schomburgki* or the kouprey *Bos sauveli*, and probably in the region. Other species, such as both species of rhinoceroses, the Sumatran

rhinoceros *Dicerorhinus sumatrensis* and the Javan rhinoceros *Rhinoceros sondaicus* are so low numbers that most remaining populations are threatened of extinction. The Forest Act of 1992 gives the list of protected animal species:

VERNACULAR NAME	SCIENTIFIC NAME
White-eyed river martin	<i>Pseudochelidon sirintarae</i>
Javan rhinoceros	<i>Rhinoceros sondaicus</i>
Sumatran rhinoceros	<i>Dicerorhinus sumatrensis</i>
Kouprey	<i>Bos sauveli</i>
Wild water buffalo	<i>Bubalus bubalis</i>
Brow-antlered deer	<i>Cervus eldi</i>
Schomburgk's deer	<i>Cervus schomburgki</i>
Serow	<i>Capricornis sumatraensis</i>
Goral	<i>Nemorhaedus goral</i>
Pitta de Gurney	<i>Pitta gurneyi</i>
Sarus crane	<i>Grus antigone</i>
Marbled cat	<i>Felis marmorata</i>
Asian or Malayan tapir	<i>Tapirus indicus</i>
Fea's barking deer	<i>Muntiacus feae</i>
Dugong	<i>Dugong dugon</i>

The reasons for the rarefaction or disappearance of these species are numerous. They can be summarized in a few categories:

- Hunting, either for food, but mostly for by-products used in traditional medicines (like the rhino horn, tiger bones, crocodile bile,...). The rarest is the animal, the highest is the price of the product, and the highest is the incentive for the poacher.
- Disappearance of their habitat to agriculture development (swampy areas or central Thailand which used to host the Schomburgk's deer have been drained to develop rice cultivation)
- Splitting of their former habitats into small non-contiguous vestigial territories, separated by agriculture land. Chances of meeting and breeding are therefore too small to hope for a survival of

these populations. This may also have disrupted traditional former migration patterns, thus preventing some species access to major source of food (elephants)

- Increasing encroachment of the habitats for apparently innocuous activities (like collection of forest products) but which provoke a disturbance of the habits and behavior of some species, thus disrupting their chances of survival (the banteng used to be active during the day; it is now a nocturnal animal).

- Use of dangerous agriculture pesticides (insecticides, weed control products, fertilizers, poisons for rodents control, etc.) provokes a decrease in birth success rates, leading to rarefaction of some species (DDT is known to fragilize the egg shells in many bird species, especially birds of prey. It is still being used in Thailand). It also decreases the food supply to many animals feeding on insects, amphibians, or weeds.

1.3 DONOR ACTIVITIES IN WILDLIFE MANAGEMENT

Thailand has not ratified the Rio biodiversity convention. Many donors are thus reluctant to help the country as they are not convinced of the political commitment of the country to seriously address these problems. Furthermore, many credit lines, such as the Global Environment Facility, remain out of reach, as they are reserved to the countries who ratified this convention. However there are now talks for an eventual ratification soon.

According to the RFD, no major project of cooperation is being implemented at the moment in the national parks. In the wildlife sanctuaries, a few scattered projects exist, such as the World Bank project in Huay Khra Kaeng, but most of these are focused on the buffer zone development activities. Some donors still participate to this sector: DANIDA, European Union, WWF still finance projects in this sector, although no major project of species conservation is being financed by external funding in Thailand at the moment.

1.4 PHU KHIEO WILDLIFE SANCTUARY

Phu Khieo Wildlife Sanctuary (PKWS) is part of a vast complex of protected areas in the North Eastern Region of Thailand, which includes 6 protected areas adjacent to or near by PKWS: Nam Nao National Park, Tat Mok National Park, Tabok Huai Yai Wildlife Sanctuary, the proposed Phusum Pak Nam Wildlife Sanctuary, and Phu Kradung National Parks and Phu Pha Man National Park. The total area exceeds 2,850,000 rais (455,000 hectares). PKWS is entirely in the Province of Chayaphum, as is Nam Nao National Park and the future Phusum Pak Nam Wildlife Sanctuary. Tat Mok and Tabok Huay Yai are in Pechabun Province, Phu Kradung and Phu Pha Man are in Loei Province.

PKWS was officially created by the Revolutionary Council Decree 154 on 24 May 1972, and confirmed in the Royal Decree 1960 Preservation and Protection of Wildlife on 26 February 1979, which extended its area to 975,000 rais (156,000 hectares) and is the third largest wildlife

sanctuary in Thailand.

Its main geomorphological features are a sandstone table top plateau rising steeply from the surrounding plains, and a karstic very accidented mountainous area in the west. Its northern and western boundaries are naturally protected by the adjacent Nam Nao National Park, Tat Mok National Park, and Tabok Huai Yai Wildlife Sanctuary, but its eastern and southern borders are largely developed for agriculture activities, the escarpment providing somehow a kind of natural protection from the encroachment by local populations. PKWS overlaps the watershed of 3 major rivers: Lam Chee River, Lam Saphung River and Nam Phrom River.

However, the pressure on the park is increasing, due to the increase of the populations, the fragilization of the limits of the ecosystem due to timber collection and forest fires, and development project who threaten the integrity of the site.

Still, the area is in fairly good condition. The vegetation cover is degraded in some peripheral areas only, and the situation here is not as bad as to have yet severely degraded the core of the area. Several types of ecosystems are found in the park:

- Hill evergreen forest
- Dry evergreen forest
- Tropical rain forest (endangered as closest to human encroachment)
- Dipterocarp forest (most susceptible to fire)
 - * True dipterocarp forest
 - * Mixed pine (*Pinus kesiya*) and deciduous dipterocarp forest
- Bamboo forest
- Grasslands (both natural and anthropic)

This variety of habitats allow a large variety of wildlife to thrive in this area. The actual list of vertebrates includes the following number of families, genres and species:

	FAMILIES	GENUS	SPECIES
MAMMALS	25	47	57
BIRDS	44	145	223
REPTILES	12	21	28
AMPHIBIANS	6	8	15
FISH	11	20	26
TOTAL	98	241	349

This work is still preliminary and several new species have been found or recorded in the last few months.

Several of the species in PKWS are locally and internationally endangered. Some of the key species present in the area are:

- the Sumatran rhinoceros, *Dicerorhinus sumatrensis*, could still survive in the western and central parts of the WS. Footprints were seen one year ago.
- the status of the Fea's barking deer, *Muntiacus feae*, is unknown. This very rare species has been seen occasionally, and a skin is kept at the visitor's center in Nam Nao NP.
- the Sarus crane's, *Grus antigone*, last breeding grounds were in the WS. It has now completely disappeared from the area. The reason of this disappearance have not been studied.
- a small population of White-winged duck, *Cairina scutulata*, still nests in PKWS. It is one of the 3 sites where this species breeds in Thailand. Its numbers are unknown.
- The very rare Oriental darter, *Anhinga melanogaster*, still exists. PKWS could be the only remaining breeding site of this species in Thailand.
- The Siamese crocodile, *Crocodylus siamensis*, exists in the PKWS in 3 areas. Its habitat is lowland rivers, and thus in the most threatened areas in the WS, close to human populations. An existing project of dam on the Saphung river could destroy one of these 3 areas.

Other species considered as endangered such as Asian elephant, tiger, gaur, banteng, Asian wild dog, etc. are also present in the WS, in sustainable numbers.

Some protected botanic species also exist in the park, like for example *Sapria himalayana*.

2 **PROJECT DESCRIPTION**

2.1 **LOGICAL FRAMEWORK**

2.1.1 **Identification of the problems**

Some species have disappeared or are endangered				
Some areas within the WS are degraded				
Forest fires destroy the fringes	Encroachment for timber, game and forest products	Cattle encroachment	Some development projects threaten prime wildlife habitat of key species	Ecological buffer zone has been destroyed

Integrity of the area is threatened			
Degradation of the borders		Political misunderstandings	
Lack of awareness of the neighboring populations	WS seen as a free resource to be used at will	Political pressure in the buffer zone creates misunderstandings	RFD is not respected by populations in the buffer zone

Correct management options cannot be chosen					
Incomplete knowledge of the problems		Management options insufficiently developed			
Knowledge of the status of the ecology and biodiversity of the park is incomplete	Relations with surrounding protected areas are not known	Some Phu Khieo RFD staff members do not assume their responsibilities	Lack of a management plan	Phu Khieo staff lacks training and/or opening to the outside conservation world	Lack of coordination some operation

2.1.2 Solutions

Restoration of habitats for key species				
Natural restoration of degraded areas				
Fire control measures	Encroachment stopped	Fencing cattle paths	EIS of development projects in and around the WS	Partial restoration of a buffer zone

Integrity of the area is restored and sustainably established			
Respect of the borders		Clarify political situation	
Environmental education	Explanation of the role of a P.A.	Contacts with local and regional authorities	Improve image of RFD

Preparation of a management plan for PKWS and Management guidelines for the whole complex of P.A.					
Improve knowledge on the ecosystem and biodiversity		Staff correctly trained to prepare a management plan			
Complete the ecological research in the WS	Replace the WS in a regional perspective	Improve motivation of the RFD staff	Preparation of a management plan	Training and study tours for project staff	Improve communication between relevant agencies

2.1.3 Logical framework

	Intervention logic	Objectively verifiable indicators	Sources of verification	Assumptions
Overall objectives	Biodiversity Conservation			
Project purpose	Sustainable management of Phu Khieo Wildlife Sanctuary	Improvement of the overall situation	Project reports RFD reports	A global management approach is taken for the whole complex The neighboring P.A. benefit from similar development projects
Results	1. An efficient management plan for the WS and the surrounding areas	Management Plan document at the end of the prep. phase.	A copy given to E.C.	A social and political consensus is reached The RFD staff trained by the project goes on working in PKWS
	2. A better knowledge of the biodiversity and ecology of the WS	Realization of the research programme	Publication of scientific work	
	3. A restoration of key species habitats and populations	Increase of key species populations	Census and surveys of flora and fauna	

	Intervention logic	Objectively verifiable indicators	Sources of verification	Assumptions
	4. Control of the factors threatening the sustainability of the WS	Decrease of the number of infractions	Project annual report	
	5. Environmental awareness	Education programmes in schools, social groups, etc.	Equipment of a mobile unit Development of programmes	
Activities	1.1 Prepare and implement a management plan 1.2 Give the implementation means to the RFD	E.C. Technical Assistance 70MM Equipment. Vehicles Training Participation to the operating costs		<p>The local populations, politicians and authorities in the buffer zone agree to cooperate</p> <p>The RFD agrees to take the necessary strong steps to solve the political problems in some areas.</p> <p>The development projects threatening the WS are modified.</p>
	2.1 Create an Ecological Research Center 2.2 Develop a research programme	GOT human resources civil works WS operating budget		
	3.1 Develop a cooperation with national and international agencies for reintroduction/reinforcement activities			
	4.1 Upgrade the protection facilities of the WS 4.2 Create and upgrade fire control centers			

	Intervention logic	Objectively verifiable indicators	Sources of verification	Assumptions
	5.1 Upgrade the training facilities in PKWS 5.2 Equip a mobile unit for training in the buffer zone 5.3 Equip the visitor center			

2.2 PRIMARY OBJECTIVES

2.3 SPECIFIC OBJECTIVES

To develop and implement a management plan for Phu Khieo Wildlife Sanctuary and propose management guidelines for the whole P.A. complex

To reduce human pressure on natural resources

To raise community environmental awareness

3 PROJECT COMPONENTS

3.1 SUPPORT ACTIVITIES

These activities will mostly be developed during the first phase of the project (2 years). They consist mostly of preparing and implementing the baseline studies to allow the preparation of a comprehensive management plan for PKWS, including the regional dimension needed for the migrating species. Some emergency activities will also be developed here, such as the creation of the fire control units.

3.1.1 Preparation of a management plan

A management plan is a fundamental tool for a correct long-term management programme of a protected area. It has to be prepared after a fine knowledge of the ecological processes and of the problems threatening the sustainability of the area has been reached. The management plan of PKWS will also have a regional dimension due to the inclusion of the WS in a complex of several other protected areas, among which some species migrate freely. Some of the key species are international migrators, which will add a further dimension to some of the research being proposed.

3.1.1.1 For Phu Khieo Wildlife Sanctuary

A comprehensive management will be prepared, including the results and recommendations of the research programme. This document will have to be regularly updated in order to incorporate the activities completed and the new propositions. This document will have to include:

3.1.1.1.1 Conservation objectives strategy

The objectives of the WS will have to be clearly defined and developed. A choice will have to be done about the strategy to implement in PKWS: an intervention approach, in order to keep the grasslands open, or a non-intervention approach, to help and restore the climactic forest cover. It will have to be decided whether the plantation programme ongoing in some areas of the park should not be stopped in favor of fire control measures to allow a natural restoration of the forest. A secondary plantation programme will have to be done to replant some disappeared species, but not with commercial species such as the ongoing one.

According to the zoning, various approaches can be selected for different areas.

3.1.1.1.2 Zoning

This approach will have to be carefully analyzed in order to split the WS in to several areas depending on the activities allowed. There may be areas reserved for:

- tourism
- integral conservation
- reintroduction programmes
- education purposes
- restoration
- special research activities
- key species areas
- buffer zones
- etc.

Each area will have specific activities allowed, and will have to be carefully designed in order to avoid negative interaction, such as putting education sites next to prime key species habitat, or putting a plantation programme in a grassland restoration area.

3.1.1.1.3 Management priorities

The WS does not have yet such a document. The activities are being proposed every year, and executed according to the budget given to the WS. In a management plan, the activities will be planned on a medium to long term basis, in order to plan over several years and prioritize the annual programme. This list of priority will have to be regularly updated. This priority will also include the sites of intervention when a choice will have to be done. This will imply a prior assessment of the problems to address, and their hierarchical importance according to the general policy selected.

3.1.1.1.4 Management coordination

Some activities proposed within the WS may have negative impacts one to each other, or on the contrary have a potentializing effect. The management plans will gather the needs and priorities of the different sections of the park, and integrate them in order to optimize their benefit. It will be a tool to help a direct cooperation between the sections, as well as with the areas around the WS.

3.1.1.1.5 Special action programmes

This management plan may help to identify some activities which cannot be reasonably implemented through the only financial and technical capacities of the RFD. It will thus be used as a base to attract other donors and/or technical agencies to develop some action programmes. These actions could be for example to develop a large scale reintroduction programme for some key species, an inclusion of the WS in international conservation activities, large scale specific research on some key species, etc.

3.1.1.2 For the surrounding protected areas

The geography of PKWS makes a broadening of some activities necessary. Many species probably migrate between the various neighboring protected areas; The watersheds may need a regional management approach; some environmental impact studies for projects outside the WS will have to be addressed, and the role of a major uninterrupted forest block will have to be assessed and compared to having a splitting of smaller P.A. separated by cultivated lands. It is thus proposed that the project will address some of the environment issues with a close cooperation with the neighboring wildlife sanctuaries and national parks, and also the forest reserves and the buffer zones management authorities.

In cooperation with the neighboring protected areas, some management guidelines will be prepared in order to secure the migration routes of some species, such as elephant, and protect the habitats of some other key species in the complex. These guidelines will be prepared through a participatory approach with the following protected areas:

- Tabok Huai Yai Wildlife Sanctuary, Province of Pechabun
- Tat Mok National Park, Province of Pechabun
- Nam Nao National Park, Province of Chayaphum
- Phusum Phak Nam Wildlife Sanctuary, Province of Chayaphum (under creation)
- Phu Kradung National Park, Province of Loei

Several other areas, national parks, wildlife sanctuaries and forest reserves may also be included in that preparation, as they may have a role in the survival of the ecosystem.

3.1.2 Creation of an Ecological Research Center

Many information are still missing to achieve a management plan. A research programme will thus be developed in order to complete the existing information, and propose management recommendations for management purposes. In order to coordinate this research programme, it is proposed to equip an ecological Research Center within the existing Natural Resources Management section

3.1.2.1 Basic equipment

The basic equipment would consist on the small equipment needed to start and develop the research programmes: binoculars, telescope, audio-video equipment, G.P.S., telemetry equipment, teledetection equipment, a computer, camping equipment, a 4x4 vehicle, etc. The list would be completed once the activities are identified.

3.1.2.2 Reference library

Reference books on environment in the region will be purchased in order to provide information for the research programmes. Subscriptions to several relevant publications will be provided.

3.1.2.3 Preparation of an ecological research programme

PKWS need its own research programme in order to propose a cooperation with the universities and research organizations in Thailand and overseas. The priorities will go first to the research needed for the preparation of the management plan:

- Identification of the key areas

* Key ecological units

Role of the whole ecosystem
Repartition of the various forest systems

* Key species habitats

Area
Status
Need for restoration
Risks

* Vulnerable areas

Environmental impact study of the proposed Lam Saphung dam
Ban Lon area
Eastern boundaries
Core of the WS

- Identification and appreciation of the problems

Forest fires
Illegal logging
Poaching
Cattle encroachment
Forest products collection
Loss of the continuity of the system

3.1.2.4 Development of the existing GIS to an operational tool

A GIS has been prepared by Khon Kaen University on a funding by CIDA for Phu Khieo Wildlife Sanctuary. This tool is at the moment a research tool, but has not been upgraded into a management tool. It is proposed to work on this project to insert the missing management dimension, and use this GIS to help and choose the management options. It will need to be updated, as the data are already a few years old, and the forest has changed, especially on the boundaries. The basic equipment will be provided: computer, graphic table, printer, telemetry equipment,... Khon Kaen University could be used for training PKWS staff to use this GIS.

3.1.2.5 Preparation of specific research projects

- Programme on key ecosystems

Hill evergreen forest
Dry evergreen forest

Tropical rain forest
Dipterocarp forest
 True dipterocarp forest
 Mixed pine (*Pinus kesiya*) and deciduous dipterocarp forest
Bamboo forest
Grasslands
Humid areas

- Programme on key species

Mammals: Sumatran rhinoceros, *Dicerorhinus sumatrensis*, Fea's barking deer, *Muntiacus feae*, elephant *Elephas maximus*, gaur *Bos gaurus*, banteng *Bos javanicus*, tiger *Panthera tigris*, smaller cats *Felis* sp., etc.

Birds: Sarus crane, *Grus antigone*, White-winged duck, *Cairina scutulata*, Oriental darter, *Anhinga melanogaster*, Vultures, etc.

Reptiles: Siamese crocodile, *Crocodylus siamensis*

Plants: *Sapria himalayana*

- Programme on the migrating species and inter-relation with surrounding areas

- Environmental impact of the problems (used to establish a hierarchy of the management actions.

3.1.3 Infrastructure improvement

Some activities of infrastructure improvement will be requested from the RFD:

3.1.3.1 Delimitation of the boundaries of the WS

The boundary of the park is not clearly identified, and some areas is a source of conflict with the local people. It is thus proposed that a small boundary path be cleared and maintained by the Protection Centers and Units staff. Concrete posts would be placed every 300m, and their position taken by G.P.S..

3.1.3.2 Fencing some access areas

In some area where cattle encroaches the WS, a cattle fence would be raised in order to stop these incursions. The marauding cattle found within the WS will be brought back to the Protection Units and the owner fined.

3.1.3.3 Building for the Ecological Research Center

A building will have to be built to host the research center. It is proposed that a 4 rooms building similar to the guest house next to the Headquarters be built for that purpose.

3.1.4 Equipment improvement

The project will provide some extra equipment to PKWS:

- One computer for each section (5) + printer. A network linkage would be proposed in order to optimize the utilization.
- One scanner, for the information and education section
- One graphic table for the GIS
- 2 good quality color printers (GIS and EES)
- Binoculars, Telescope
- G.P.S.
- Video camera, cameras, audio equipment
- Vehicles (motorcycles, 4x4, a tractor/grader and one Unimog)
- Telephone system
- Radio equipment to complete the existing one
- Generators

3.1.5 Creation of 2 fire control units

In order to address the fire problem, it is proposed that 2 new fire control units be created, in Bung Paen and Ban Lon, and that some equipment be given to the Kudjik existing unit. The Unimog would be based in Bung Paen.

3.2 PROJECT INTERVENTIONS

These activities are less detailed as they will derive from the propositions made during the preparatory phase.

3.2.1 WS Management

3.2.1.1 Protected area management

3.2.1.1.1 Application and development of the management plan

The activities proposed in the Management Plan will be executed. The management plan itself will be updated annually.

3.2.1.1.2 Provision for helicopter surveys

A provision has been made for implementing a systematic survey by helicopter of the key areas. It is useful to control illegal activities (logging, encroachment, fires,...) But also to survey the areas impossible to access on foot (especially in the western boundary of the park). Teledetection equipment will be used for the analysis of some migration routes. And helicopter support will be used for the surveys of areas difficult to access on foot.

3.2.1.2 Research and Development

3.2.1.2.1 Research of partners

Once the specific research programme is identified, partners for implementing it will be sought. They will be both national and international research bodies, coordinated by PKWS staff. They will be allowed to use the research facilities as long as their work coincides with the priorities of the WS.

3.2.1.2.2 Development of research activities

The activities will be coordinated by the Ecological Research Center. Contracts will stipulate that the PKWS staff will have to be implicated in the research activities as much as possible, and that copies of the reports and publications be given back to PKWS, for the reference library.

International agencies will be sought as partners in the implementation of costly of large scale research activities, and where a international dimension needs to be reached.

Some high profile research activities should be conducted in order to attract international attention to PKWS. Sumatran rhinoceros, sarus crane, white winged duck and Siamese crocodile are examples of high profile species.

3.2.1.2.3 Update of the GIS

A regular update of the GIS will be done in order to compile and synthesize all the information collected by the research, and propose management recommendations.

3.2.1.2.4 Update of the management plan

This update will have to be done annually in incorporating the results of the research.

3.2.1.2.5 Publications

It is proposed that a series of publications be done by PKWS staff to make the international scientific community aware of what is happening in the WS.

3.2.1.3 Programme of reintroduction/reinforcement of key species

The status of some endangered species will have to be assessed, and the measures for their safeguard will be assessed. There are remaining populations of several key species in the park, and management measures may be enough to restore the population to a more healthy level. However, for some species, a reintroduction programme would be necessary as they have completely disappeared (e.g. Sarus crane). However, prior to these reintroduction programmes, the causes of their disappearance will have to be assessed, and solved.

A cooperation with the neighboring Animal Breeding Center could eventually be proposed if reintroduction programmes are to be developed. The sanitary situation will however need to be improved, as they have problems with diseases, especially in birds, which should not be introduced in the healthy populations of the WS.

Some past reintroduction programmes in PKWS will have to be reassessed, like the hog deer *Axis porcinus*, which has to be completed, although successful. The Eld's deer *Cervus eldi* programme has apparently failed, which is good as the subspecies released in the park was not the one existing previously in the region.

A cooperation with international conservation organizations will be proposed for programmes which cannot be dealt only by the RFD. The Sumatran rhinoceros conservation is an example of the need of an large, international programme.

3.2.1.4 Legislative reform

It is proposed within the RFD to assess the possibility of gathering all the protected areas of the complex into one single large management unit. If it is to be realized, the impact of the restructuration will have to be carefully assessed, and the legislative status will have to be chosen accordingly.

3.2.1.5 Eco-tourism and other initiatives

Tourism is not an activity to be developed in wildlife sanctuaries. However Nam Nao National Park, just at the northern boundary of the park, receives 200,000 visitors per year.

Some areas of the WS are traditionally visited by tourists. These areas are leisure sites, with no special infrastructures. It is proposed to equip two tourists sites at Ban Lon and Saphung Nua, in order to canalize the visitors to some limited areas of the WS, and do not encroach freely within the WS. The visitors seen in the park had fishing equipment with them, which is forbidden. A stricter control by the Protection Units will be necessary.

The visitors coming to the WS do not find any structure to get the information they request. It is proposed to install a small visitor center at the entrance of the WS, to help visitors to get information.

3.2.1.6 Training

A programme of training is proposed, and will include mostly short-term training, directed towards specialization of the project staff, and study tours to visit other areas where problems similar to PKWS have been addressed.

The type and details of the training activities will be decided later on, when the management plan will have identified the areas where a more in-depth knowledge is necessary.

3.2.1.7 Education and extension

3.2.1.7.1 Phu Khieo Environment Education Center

A cooperation with the Phu Khieo Environment Education Center, at the boundary of the park, will be developed in order to redirect the visitors from the core of the park to areas where tourism is allowed. Training facilities of the Education Center will thus be better used.

This center already belongs to the RFD, but to a different division than the Wildlife Conservation, which manages the WS.

3.2.1.7.2 Equipment of the Education and Extension Section

The Education and Extension section will be reinforced through various activities:

- Equipment of the school education center

The existing unit will be provided with equipment allowing the reception and catering of school groups or students (60 people for each group): camping equipment, cooking equipment, educational material, nature interpretation equipment, etc.

It is however recommended that no heavy infrastructure is built in the park, when a similar center, the Phu Khieo Environment Education Center, already exists at the boundary of the WS. Its facilities should be used instead of replicating another center inside the WS.

3.2.1.7.3 Equipment of the mobile unit

A mobile unit will be equipped with audio-visual equipment and educational material to support the environment school education programme already developed by the WS staff.

3.2.1.7.4 Equipment of a new nature trail

A nature trail already exists near the headquarters. Another nature trail will be equipped in the areas where education activities will take place. The zoning of the WS will indicate the best site for that activity.

3.2.1.8 Institutional linkage with other protected areas

Several activities have been implemented in the WS in cooperation with other agencies (Khon Kaen University, Kasetsart University, Wildlife Department of Malaysia, etc.). Similar initiatives will be stimulated and linkage with other protected areas and environment institutions in Thailand, in the region and in the world.

Institutional linkages may even be officialized for specific activities.

3.2.1.9 Seminars and public relation campaign

Information seminars for local and national authorities will be held to present to project and its results. A campaign of press will be used to present the project findings and show the successful pilot project activities.

4 PROJECT INPUTS

4.1 TECHNICAL ASSISTANCE

Long term assistance:

1 full time technical advisor: 70MM

Short term consultants:

- GIS training (Khon Kaen University)
- Ecological research specialist
- Training in wildlife survey and inventory
- Training in botanic survey and inventory
- others consultants according to the needs identified during the preparatory phase

(c.30 MM)

4.2 EQUIPMENT

		NRMS	EIS	ADMS	PAERS	PRS	CPC	TOTAL
INFRASTRUCTURES								
Building	Unit	1						1
Delimitation (200 km)	Km			200				200
Tourist sites	Unit						2	2
EQUIPMENT								
Computers	Unit	1	1	1	1	1		5
Printers (color)	Unit	1	1					2
Printers	Unit			1	1	1		3
Graphic table	Unit	1						1
Research equipment	Unit	1						1
Binoculars	Unit	3	15			10		28
Telescope	Unit	1	2					3
Library	Unit	1						1
GIS software	Unit	1	1					1
Scanner	Unit		1					1
Video Camera	Unit	1	1					2
Cameras	Unit	1						1
Cameras	Unit		4					4
Slide projector	Unit		2					2
Audio Equipment	Unit		2					2
Pedagogic equipment.	Unit		2					2
Fire control	Unit						1	1
Helicopter surveys	Hour			300				300
Nature trail	Unit		1					1
Visitor Center	Unit				1			1
School Education Center	Unit		1					1
Publications	Unit		1					1

		NRMS	EIS	ADMS	PAERS	PRS	CPC	TOTAL
Telephone	Unit			1				1
Radio-Equipment	Unit	1	1	2	1	2	4	11
Generators (10KW)	Unit			5				5
Unimog	Unit						1	1
Motorcycle	Unit			5			42	47
4x4 pickups	Unit	1	1		1	1	2	6
Grader	Unit			1				1
Rangers Equipment	Unit					50		50

4.3 CIVIL WORKS

Delimitation of the WS (Boundary path and concrete markers, fences in some areas)

Building for the Research Center

Equipment of 2 tourist sites

4.4 GOT INPUTS

Research assistant 7 years

Civil works

Participation to the running costs of the WS

4.5 BUDGET

(In ECUS)	NRMS	EIS	ADMS	PAERS	PRS	CPC	TOTAL
INFRASTRUCTURES							
Building	10,000						10,000
Delimitation (200 km)			66,667				66,667
Tourist Centers						20,000	20,000
EQUIPMENT							
Computers	3,333	3,333	3,333	3,333	3,333		16,667
Printers (color)	1,000	1,000					2,000
Printers			333	333	333		1,000
Graphic table	1,667						1,667
Research equipment	6,667						6,667
Binoculars	400	2,000			1,333		3,733
Telescope	833	1,667					2,500
Library	5,000						5,000
GIS software	5,000	5,000					10,000
Scanner		1,000					1,000
Video Camera	1,667	1,667					3,333
Cameras	3,333						3,333

(In ECUS)	NRMS	EIS	ADMS	PAERS	PRS	CPC	TOTAL
Cameras		4,000					4,000
Slide projector		667					667
Audio Equipment		1,333					1,333
Pedagogic equipement.		6,667					6,667
Fire control						16,667	16,667
Helicopter surveys			20,000				20,000
Nature trail		3,333					3,333
Visitor Center				8,333			8,333
School Education Center		5,000					5,000
Publications		6,667					6,667
Training Courses	To be allocated later on						0
Species restoration	166,667						166,667
Telephone			6,667				6,667
Radio-Equipment	1,667	1,667	3,333	1,667	3,333	6,667	18,333
Generators (10KW)			16,667				16,667
Unimog						33,333	33,333
Motorcycle			5,000			42,000	47,000
4x4 pickups	16,667	16,667		16,667	16,667	33,333	100,000
Grader			3,333				3,333
Rangers Equipment					8,333		8,333
TOTAL	223,900	61,667	125,333	30,333	33,333	152,000	626,567

5 PROJECT IMPLEMENTATION

5.1 PROJECT ORGANIZATION

5.2 INSTITUTIONAL ARRANGEMENTS

5.3 IMPLEMENTATION ARRANGEMENTS

5.4 MONITORING AND EVALUATION

5.5 REPORTING SEQUENCE

6 PROJECT OUTPUTS

6.1 INTEGRATED PROTECTED AREAS SYSTEM (PAS)

Management guidelines for the surrounding protected areas complex
Research programme and relation with university and research centers

6.2 WILDLIFE SANCTUARY

Management plan for the WS and mean to implement it
Delimitation of the WS
Ecological Research Center and research programme
Environment education center and mobile unit
Visitor Center

6.3 LOCAL COMMUNITY NEEDS IN BUFFER ZONES

Environmental education and awareness programme
Delimitation of the WS

7 PROJECT SUSTAIN ABILITY

The projects focuses on the training local staff, and the environment education of the local populations. It is thus hoped that through these processes, a sustainability of the WS will be reached.

Some conditions however have to be met:

- the staff will stay in position at PKWS, or will adequately train their successors
- the RFD will go on funding the recurrent costs of the initiated activities
- the populations will understand the need to conserve the area, and will enforce a “social police” control on the people’s activities in the WS
- their income will be improved and the need to prey on the natural resources will be replaced by a rational utilization of the restored resources in the buffer zone

8 PROJECT JUSTIFICATION

8.1 POLITICAL

Environmental issues are becoming more and more in focus in Thailand. The conflicts between local populations are regularly reported in the press. Such a project will be an example of how man and protected areas can co-exist, and will be used as an example to develop guidelines for similar projects in and around other protected areas.

8.2 TECHNICAL

RFD staff, although dedicated, sometimes lack the knowledge of addressing some specific situation. As training activities, both in the field and outside PKWS, will be developed, this issue will be much improved at the end of the project.

8.3 ENVIRONMENTAL

PKWS is a very important refuge of biodiversity in Thailand. It’s role in conserving healthy and sustainable populations of major species, both animal an vegetal, has to be acknowledged. The pressure around the park is building up, and the project will insure a better chance of survival for these species, and a good sustainability of the WS.

The whole complex of protected areas will also benefit from the participation to the *in situ* training activities, and from the establishment of management guidelines by the project activities.

Local populations will have a better understanding of the environmental processes from which their livelihood depends on, and henceforth will participate to the conservation of the ecosystem.

8.4 ECONOMIC

The project will propose pilot models of increasing the income of neighboring populations, in order to decrease the pressure on the natural resources of the WS. New techniques for alternative use of natural resources will also have a positive impact on the populations income.

8.5 SOCIAL

The project will provide new techniques, new methods and new products for improving the social situation of the people, especially in providing alternative to difficult and potentially dangerous use of the natural resources of the WS.

8.6 INSTITUTIONAL

A correctly trained staff will be able to train new staff, and thus reinforce the technical competence of the RFD. In PKWS, the research facilities will be another stronghold on which RFD can develop its expertise and knowledge of the biodiversity in Thailand.

9 PROJECT RISKS

The feasibility study shows that this project has good chances to succeed. However, there are some risks which might hinder the outcome of the activities:

- The development programmes in the Province take over the need to conserve the WS (dam in Saphung Nua):

The representative of the Governor of Chayaphum Province has indeed expressed his total support for the project. It is hoped that these projects will be carefully assessed and negotiated with the RFD before being built, and that their ecological impact will be minimized if alternative solutions cannot be found.

- The political pressure cannot be stopped in areas such as Ban Lon or Sifting Nua:
These aspects are completely out of control by the project. A strong commitment by the RFD has been issued during the debriefing meetings, and necessary pressure should be put at higher level in order to keep this risk under control, especially the "commercial" logging activities in the south west of the WS..

- The populations may be reluctant in stopping their excessive use of the resources of the WS:
The population pressure is very strong, and the project will have a direct impact on a

portion of the population only. If the pilot projects or areas are not successful enough, the pressure might not be stopped, or even be increased. The slopes of the WS could not sustain 50.000 people collecting forest products

- The neighboring protected areas may not address their role of natural barrier anymore, and the pressure on the park may increase on the northern and western boundaries:
It is recommended that the RFD takes the necessary steps towards a long-term conservation programme for the whole ecosystem, and eventually prepares new project documents to present to other donors in order to achieve it.
- The economic incentives are not enough to stop people from entering illegally the WS:
Some activities may be traditional, and difficult to compensate even through a range of economic improvement issues. This will have to be dealt with specifically through carefully orientated environment education activities.
- The RFD staff changes too often, and staff trained by the project has no chance to work in PKWS before being transferred:
RFD is aware of this risk, and will have to take the necessary measures to insure the permanence of a correctly trained staff in PKWS.
- Some animal populations, like the Sumatran rhinoceros, are too far gone to allow a restoration of the species within the WS boundaries:
The baseline surveys and research programmes will give an estimate of the remaining populations of these highly endangered species. Due to their scarcity, it may not be possible to artificially reinforce these populations within the WS. A coordination with international conservation agencies may help in preparing *ex-situ* conservation programmes, although this should be avoided whenever possible.

10 **SPECIAL CONDITIONS**

APPENDIX: WILDLIFE SANCTUARY COMPONENT

1 BACKGROUND

1.1 THE WILDLIFE, NATIONAL PARK AND NATURAL RESOURCES SECTOR

Thailand has several classification for protected areas. The 2 major forms of protected areas are the national parks and the wildlife sanctuaries.

1.1.1 Definition the national parks and wildlife sanctuaries

National Park:

It is an area of at least 10 square kilometers that contains natural resources of ecological importance or unusual beauty, or flora or fauna of special importance. An area may also be declared a park for its historical importance.

National parks are managed by the central government, Direction of National Parks, (not by the provincial government), and has staff to strictly enforce protection regulations such as stated in the National Parks Act (1961).

They are opened to the general public and for tourism.

They must not be confused with forest parks, which are administered locally for recreation purposes.

Wildlife Sanctuary:

Wildlife sanctuary are areas protected for the conservation of a species, or a group of species, or their habitats. They are reserved for scientific and conservation purposes only, and are not usually opened to the general public.

Wildlife sanctuaries are managed by the central government, Direction of Wildlife Conservation (not by the provincial government), and has staff to strictly enforce protection regulations such as stated in the Wildlife Act (1992).

They are not opened to the general public or for tourism.

1.1.2 Description of the sector

Thailand possesses 108 terrestrial national parks and wildlife sanctuaries, for a total area of 6,892,256 hectares, or 13.41% of the land area of the country, plus 18 marine national parks, for 1,505,509 hectares. These protected areas are scattered all around the country:

REGION	NATIONAL PARKS		WILDLIFE SANCTUARIES	
	NUMBER	AREA (ha)	NUMBER	AREA (ha)
NORTH	25	1,505,509	15	1,412,774
NORTH-EAST	18	999,674	9	462,958
CENTRAL	11	821,845	7	706,978
SOUTH	10	384,294	13	598,224
TOTAL (excluding marine parks)	64	3,711,322	44	3,180,934
MARINE	18	1,505,509	0	0
TOTAL	82	5,216,831	44	3,180,934

The full list of these protected areas is shown hereafter:

LIST AND AREA OF THE NATIONAL PARKS AND WILDLIFE SANCTUARIES IN THAILAND

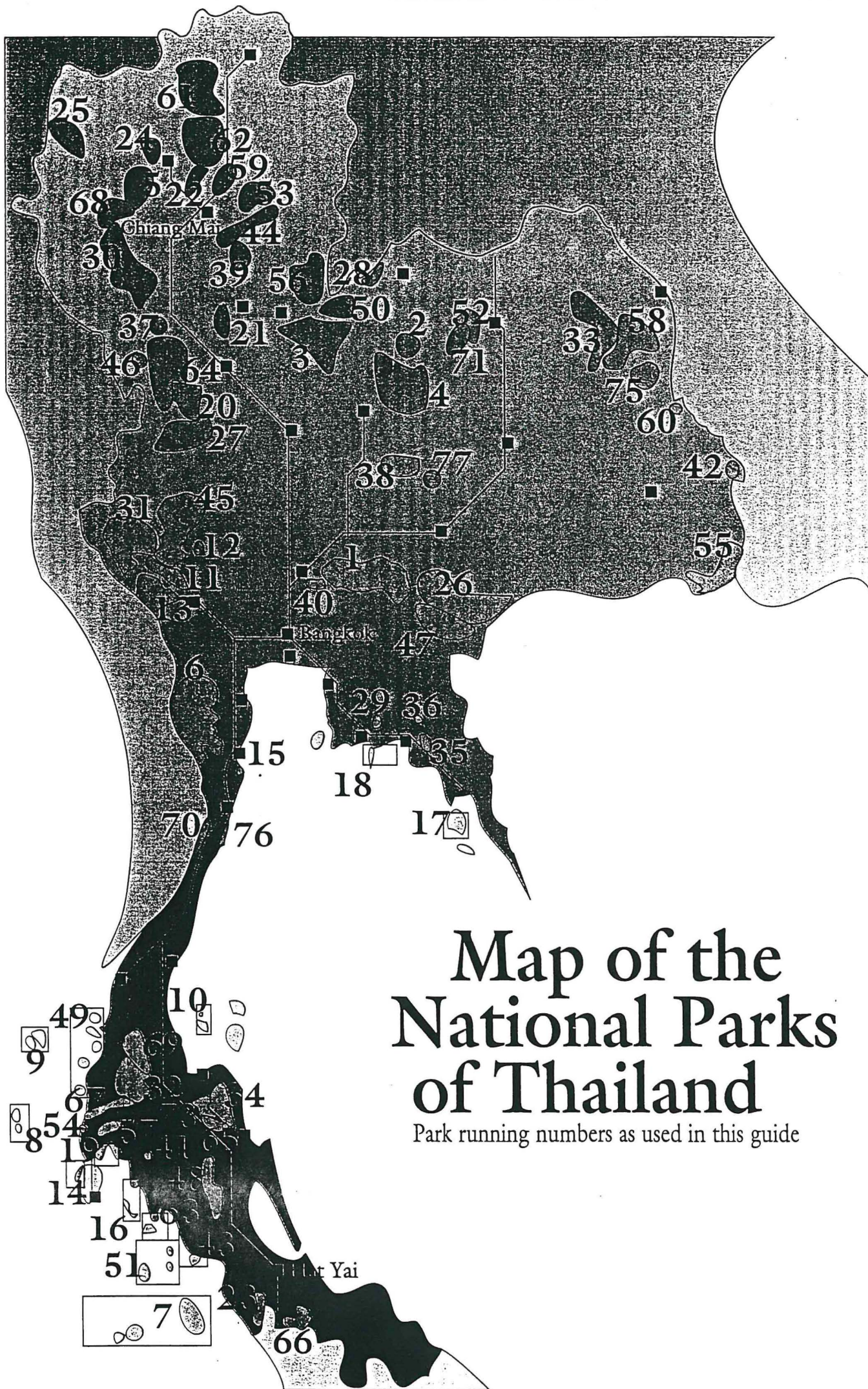
Keys: N° refers to the number in the appended map (extracted from Gray et al., 1994: National Parks of Thailand.) The national parks without a number were created after the publication of this map (1992).

Type: NP = National Park; WS = Wildlife Sanctuary

Date refers to the first date of creation (some boundaries have been later modified)

R.(Region): N = North, S = South, C = Central, NE = North East, M= Marine

N°	TYPE	SITE	DATE	PROVINCE	AREA	R.
1	NP	Khao Yai	01Sep62	Nakhon Nayok	216,864 Ha.	NE
2	NP	Phu Kradung	01Nov62	Loei	34,812 Ha.	NE
3	NP	Thung Salaeng Luang	01Jan63	Phitsanulok	126,240 Ha.	N
15	NP	Khao Sam Roi Yot	01Jun66	Prachuab	9,808 Ha.	M
4	NP	Nam Nao	01May72	Phetchabun	96,600 Ha.	N
5	NP	Doi Inthanon	01Oct72	Chiang Mai	48,240 Ha.	N
33	NP	Phu Phan	01Nov72	Sakon Nakhon	66,470 Ha.	NE
7	NP	Tarutao	01Apr74	Satun	149,000 Ha.	M
34	NP	Khao Luang	01Dec74	Nakhon Sri Thammarat	57,000 Ha.	S
22	NP	Doi Khuntan	01Mar75	Lamphun	25,529 Ha.	N
35	NP	Namtok Phliu	01May75	Chanthaburi	13,450 Ha.	C



Map of the National Parks of Thailand

Park running numbers as used in this guide

Nº	TYPE	SITE	DATE	PROVINCE	AREA	R.
11	NP	Erawan	01Jun75	Kanchanaburi	55,000 Ha.	C
29	NP	Khao Chamao - Khao Wong	01Dec75	Rayong	8,368 Ha.	C
36	NP	Khao Kitchakut	01May77	Chanthaburi	5,870 Ha.	C
37	NP	Lansang	01May79	Tak	10,400 Ha.	N
28	NP	Phu Rua	01Jul79	Loei	12,084 Ha.	NE
12	NP	Chalerm Rattanakosin	01Feb80	Kanchanaburi	5,900 Ha.	C
23	NP	Thale Ban	01Oct80	Satun	19,600 Ha.	M
13	NP	Sai Yok	01Oct80	Kanchanaburi	50,000 Ha.	C
21	NP	Ramkamheng	01Oct80	Sukhotai	34,100 Ha.	N
10	NP	Mu Ko Ang Thong	01Nov80	Surat Thani	10,200 Ha.	M
32	NP	Khao Sok	01Dec80	Surat Thani	73,874 Ha.	S
38	NP	Tat Ton	01Dec80	Chaiyaphum	21,718 Ha.	NE
24	NP	Doi Suthep - Doi Pui	01Apr81	Chiang Mai	26,106 Ha.	N
19	NP	Ao Phangnga	01Apr81	Phangnga	40,000 Ha.	M
39	NP	Sri Satchanalai	01May81	Sukhotai	21,320 Ha.	N
40	NP	Khao Sam Lan	01Jun81	Saraburi	4,457 Ha.	C
6	NP	Kaeng Krachan	01Jun81	Phetchaburi	291,500 Ha.	C
9	NP	Mu Koh Surin	01Jul81	Phangnga	13,500 Ha.	M
41	NP	Khao Phanom Bench	01Jul81	Krabi	5,012 Ha.	S
14	NP	Had Nai Yang - Si Ri Nat	01Jul81	Phuket	9,000 Ha.	M
30	NP	Mae Ping	01Jul81	Chiang Mai	100,375 Ha.	N
42	NP	Kaeng Tana	01Jul81	Ubon Ratchatani	8,000 Ha.	NE
18	NP	Khao Laem Ya - Koh Samet	01Oct81	Rayong	13,100 Ha.	M
44	NP	Wiang Kosai	01Oct81	Phrae, Lampang	41,000 Ha.	N
43	NP	Had Chao Mai	01Oct81	Trang	23,087 Ha.	M
25	NP	Namtok Mae Surin	01Oct81	Mae Hong Son	39,660 Ha.	N
45	NP	Sri Nakarin	01Dec81	Kanchanaburi	153,200 Ha.	C
26	NP	Thap Lan	01Dec81	Nakhon Ratchasima	223,580 Ha.	NE
46	NP	Taksin Maharat	01Dec81	Tak	14,900 Ha.	N
47	NP	Pang Sida	01Feb82	Prachinburi	84,400 Ha.	C
48	NP	Khao Pu - Khao Ya	01May82	Phatthalung	69,400 Ha.	S
8	NP	Mu Koh Similan	01Sep82	Phangnga	12,800 Ha.	M

Nº	TYPE	SITE	DATE	PROVINCE	AREA	R.
20	NP	Khlong Lan	01Dec82	Kamphaengphet	30,000 Ha.	N
17	NP	Mu Koh Chang	01Dec82	Trat	65,000 Ha.	M
49	NP	Laem Son	01Aug83	Ranong	31,500 Ha.	M
16	NP	Had Nopparat - Koh Phi Phi	01Oct83	Krabi	38,996 Ha.	M
50	NP	Phu Hin Rong Khla	01Jul84	Phitsanulok	30,700 Ha.	N
51	NP	Mu Koh Phetra	01Dec84	Satun	49,438 Ha.	M
52	NP	Phu Khao - Phu Phan Kham	01Sep85	Udon Thani, Khon Kaen	32,200 Ha.	NE
53	NP	Mae Yom	01Mar86	Phrae, Lampang	45,475 Ha.	N
54	NP	Khao Lam Pi	01Apr86	Phangnga	7,200 Ha.	M
55	NP	Phu Chong - Nayoi	01Jun87	Ubon Ratchatani	68,600 Ha.	NE
27	NP	Mae Wong	01Nov87	Kamphaengphet	89,400 Ha.	N
56	NP	Namtok Chatra Khan	01Nov87	Phitsanulok	54,300 Ha.	N
57	NP	Sri Phangnga	01Apr88	Phangnga	24,608 Ha.	S
58	NP	Huai Huat	01Jul88	Sakon Nakhon	82,856 Ha.	NE
59	NP	Namtok Chae Son	01Jul88	Lampang	59,200 Ha.	N
60	NP	Mukdahan	01Dec88	Mukdahan	4,850 Ha.	NE
61	NP	Sri Lanna	01Aug89	Chiang Mai	140,600 Ha.	N
62	NP	Doi Luang	01Apr90	Chiang Rai	117,000 Ha.	N
63	NP	Mu Koh Lanta	01Aug90	Krabi	13,400 Ha.	M
64	NP	Klong Wang Chao	01Aug90	Kamphaengphet	74,700 Ha.	N
65	NP	Namtok Yong	01Jul91	Nakhon Sri Tahmmarat	20,500 Ha.	S
66	NP	Khao Nam Khang	01Jul91	Songkhla	21,200 Ha.	S
67	NP	Kao Lak - Lamru	01Aug91	Phangnga	12,500 Ha.	M
31	NP	Khao Laem	01Dec91	Kanchanaburi	149,700 Ha.	C
68	NP	Aob Luang	01Dec91	Chiang Mai	55,300 Ha.	N
69	NP	Khang Krung	01Dec91	Surat Thani	54,100 Ha.	S
70	NP	Namtok Huai Yang	01Dec91	Prachuab	16,100 Ha.	S
71	NP	Phu Wiang	01Dec91	Khon Kaen	32,500 Ha.	NE
72	NP	Phu Pha Man	01Dec91	Loei	35,000 Ha.	NE
73	NP	Tai Rom Yen	01Dec91	Surat Thani	42,500 Ha.	S
74	NP	Pha Taem	01Dec91	Ubon Ratchatani	34,000 Ha.	NE
75	NP	Phu Sa Dok Bua	01Dec92	Ubon Ratchatani	23,100 Ha.	NE
76	NP	Had Wanakorn	01Dec92	Prachuab	3,800 Ha.	M
77	NP	Sai Thong	01Dec92	Chaiyaphum	31,900 Ha.	NE
	NP	Salawin	01Nov94	Mae Hong Son	72,152 Ha.	N

Nº	TYPE	SITE	DATE	PROVINCE	AREA	R.
	NP	Na Heo	01Nov94	Loei	11,716 Ha.	NE
	NP	Khun Chae	01Aug95	Chiang Rai	27,000 Ha.	N
	NP	Huay Nam Dang	01Aug95	Chiang Mai, Mae Hong Son	125,212 Ha.	N
	NP		01Dec96	Sa Keo, Buriram	59,424 Ha.	NE
	WS	Salak Phra	1966	Kanchanaburi	85,855 Ha.	C
	WS	Lum Nam Pai	1972	Mae Hong Son	118,111 Ha.	N
	WS	Phu Khieo	1972	Chaiyaphum	156,000 Ha.	NE
	WS	Khao Soi Dao	1972	Chanthaburi	74,502 Ha.	C
	WS	Huai Kha Keng	1972	Uthai Thani	278,014 Ha.	N
	WS	Khlong Nakha	1972	Ranong	53,033 Ha.	S
	WS	Khlong Saeng	1974	Surat Thani	115,531 Ha.	S
	WS	Khao Khieo-Khao Chompu	1974	Chonburi	14,470 Ha.	C
	WS	Thung Yai Naresuan	1974	Kanchanaburi	364,720 Ha.	C
	WS	Phu Luang	1974	Loei	89,695 Ha.	NE
	WS	Phu Wua	1975	Nong Khrai	18,650 Ha.	NE
	WS	Khao Ang Ru Nai	1977	Chachoengsao, Prachinburi,	103,000 Ha.	C
	WS	Yod Dom	1977	Ubon Ratchatani	22,535 Ha.	NE
	WS	Khao Banthat	1977	Phattalung	126,696 Ha.	S
	WS	Phu Miang - Phu Thong	1977	Uttaradit	69,651 Ha.	N
	WS	Mae Tuen	1978	Tak	117,300 Ha.	N
	WS	Maenam Phachi	1978	Ratchaburi	48,931 Ha.	C
	WS	Doi Chiang Dao	1978	Chiang Mai	52,100 Ha.	N
	WS	Tong Nga Chang	1978	Songkhla	18,195 Ha.	S
	WS	Kho Phanom Dongrak	1978	Si Sa Ket	31,600 Ha.	NE
	WS	Salawin	1978	Mae Hong Son	87,500 Ha.	N
	WS	Doi Pha Muang	1980	Lampang	58,312 Ha.	N
	WS	Khlong Phraya	1980	Krabi	15,358 Ha.	S
	WS	Doi Pha Chang	1980	Phayao	57,108 Ha.	N
	WS	Om Koi	1983	Chiang Mai	122,400 Ha.	N
	WS	Doi Luang	1984	Phrae	9,700 Ha.	S
	WS	Koi Sanam Phriang	1985	Kamphaengphet	10,100 Ha.	N
	WS	Mae Yuam	1986	Mae Hong Son	29,200 Ha.	N
	WS	Sab Langkha	1986	Lopburi	15,500 Ha.	C

Nº	TYPE	SITE	DATE	PROVINCE	AREA	R.
	WS	Prince Chumporn Park (South)	1988	Chumpon	31,500 Ha.	S
	WS	Prince Chumporn Park (North)	1988	Chumpon	66,499 Ha.	S
	WS	Umphang	1989	Tak	259,085 Ha.	N
	WS	Phu Sri Tan	1990	Kalasin	25,000 Ha.	NE
	WS	Hua Sala	1990	Si Sa Ket	38,000 Ha.	NE
	WS	Chalerm Pha Kiet	1991	Narathiwat	20,100 Ha.	S
	WS	Khlong Yan	1992	Surat Thani	48,800 Ha.	S
	WS	Khrao Pra - Bang Khram	1993	Krabi, Trang	15,632 Ha.	S
	WS	Huay Thap Tham - Huay Samraphu	1995	Surin	50,200 Ha.	NE
	WS	Thala Bala	1996	Narathiwat. Yala	43,316 Ha.	S
	WS	Thung Raya - Nasak	1996	Ranong. Chumpon	33,864 Ha.	S
	WS	Mae Lao - Mae Soh	1996	Chiang Mai, Mae Hong Son	51,400 Ha.	N
	WS	Tong Hay Thu	1996	Buriram	31,278 Ha.	NE
	WS	Tabok Huay Yai	1997	Pechabun	65,393 Ha.	N
	WS	Wiang Loh	1997	Payao	37,100 Ha.	N

However most of these areas have been and still are suffering serious conflicts with the increasing surrounding population in search for new agricultural land, either because of natural population increase, or due to the emigration from areas where poor management techniques have provoked a sterilization of the soils, mostly because of salinization or erosion.

Many of these areas are small (64 are less than 40,000 hectares), and are already heavily encroached and degraded. Although some are contiguous and form large protected ecosystems, most of these are scattered and separated by intensively used agricultural areas. Most species of large mammals are endangered because they cannot be sustained in small areas, and cause conflicts with local populations (e.g. elephants in the south).

1.2 KEY ISSUES TO WILDLIFE MANAGEMENT IN THAILAND AND IN THE REGION

Many animal and plant species are in the verge of extinction in Thailand and in South East Asia. Some species, although still on the lists of legally protected animals, are probably extinct in the country, like the Schomburgk's deer *Cervus schomburgki* or the kouprey *Bos sauveli*, and probably in the region. Other species, such as both species of rhinoceroses, the Sumatran rhinoceros *Dicerorhinus sumatrensis* and the Javan rhinoceros *Rhinoceros sondaicus* are so low numbers that most remaining populations are threatened of extinction.

The Forest Act of 1992 gives the list of strictly protected animal species:

VERNACULAR NAME	SCIENTIFIC NAME
White-eyed river martin	<i>Pseudochelidon sirintarae</i>
Javan rhinoceros	<i>Rhinoceros sondaicus</i>
Sumatran rhinoceros	<i>Dicerorhinus sumatrensis</i>
Kouprey	<i>Bos sauveli</i>
Wild water buffalo	<i>Bubalus bubalis</i>
Brow-antlered deer	<i>Cervus eldi</i>
Schomburgk's deer	<i>Cervus schomburgki</i>
Serow	<i>Capricornis sumatraensis</i>
Goral	<i>Nemorhaedus goral</i>
Pitta de Gurney	<i>Pitta gurneyi</i>
Sarus crane	<i>Grus antigone</i>
Marbled cat	<i>Felis marmorata</i>
Asian or Malayan tapir	<i>Tapirus indicus</i>
Fea's barking deer	<i>Muntiacus feae</i>
Dugong	<i>Dugong dugon</i>

The reasons for the rarefaction or disappearance of these species are numerous. They can be summarized in a few categories:

- Hunting, either for food, but mostly for by-products used in traditional medicines (like the rhino horn, tiger bones, crocodile bile,...). The rarest is the animal, the highest is the price of the product, and the highest is the incentive for the poacher.
- Disappearance of their habitat to agriculture development (swampy areas or central Thailand which used to host the Schomburgk's deer have been drained to develop rice cultivation)
- Splitting of their former habitats into small non-contiguous vestigial territories, separated by agriculture land. Chances of meeting and breeding are therefore too small to hope for a survival of these populations. This may also have disrupted traditional former migration patterns, thus preventing some species access to major source of food (elephants)
- Increasing encroachment of the habitats for apparently innocuous activities (like collection of forest products) but which provoke a disturbance of the habits and behavior of some species, thus disrupting their chances of survival (the banteng used to be active during the day; it is

now a nocturnal animal).

- Use of dangerous agriculture pesticides (insecticides, weed control products, fertilizers, poisons for rodents control, etc.) provokes a decrease in birth success rates, leading to rarefaction of some species (DDT is known to fragilize the egg shells in many bird species, especially birds of prey. It is still being used in Thailand). It also decreases the food supply to many animals feeding on insects, amphibians, or weeds.

1.3 DONOR ACTIVITIES IN WILDLIFE MANAGEMENT

Thailand has not ratified the Rio biodiversity convention. Many donors are thus reluctant to help the country as they are not convinced of the political commitment of the country to seriously address these problems. Furthermore, many credit lines, such as the Global Environment Facility, remain out of reach, as they are reserved to the countries who ratified this convention. However there are now talks for an eventual ratification soon.

According to the RFD, no major project of cooperation is being implemented at the moment in the national parks. In the wildlife sanctuaries, a few scattered projects exist, such as the World Bank project in Huay Khra Kaeng, but most of these are focused on the buffer zone development activities. Some donors still participate to this sector: DANIDA, European Union, WWF still finance projects in this sector, although no major project of species conservation is being financed by external funding in Thailand at the moment.

1.4 PHU KHIEO WILDLIFE SANCTUARY

1.4.1 Biological diversity

Phu Khieo Wildlife Sanctuary (PKWS) is part of a vast complex of protected areas in the North Eastern Region of Thailand, which includes 6 protected areas adjacent to or near by PKWS: Nam Nao National Park, Tat Mok National Park, Tabok Huai Yai Wildlife Sanctuary, the proposed Phusum Pak Nam Wildlife Sanctuary, and Phu Kradung National Parks and Phu Pha Man National Park. The total area exceeds 2,850,000 rai (455,000 hectares). PKWS is entirely in the Province of Chayaphum, as is Nam Nao National Park and the future Phusum Pak Nam Wildlife Sanctuary. Tat Mok and Tabok Huai Yai are in Pechabun Province, Phu Kradung and Phu Pha Man are in Loei Province.

PKWS was officially created by the Revolutionary Council Decree 154 on 24 May 1972, and confirmed in the Royal Decree 1960 Preservation and Protection of Wildlife on 26 February 1979, which extended its area to 975,000 rai (156,000 hectares) and is the third largest wildlife sanctuary in Thailand.

Its main geomorphological features are a sandstone table top plateau rising steeply from the surrounding plains, and a karstic very accidented mountainous area in the west. Its northern and western boundaries are naturally protected by the adjacent Nam Nao National Park, Tat Mok National Park, and Tabok Huai Yai Wildlife Sanctuary, but its eastern and southern borders are largely developed for agriculture activities, the escarpment providing somehow a kind of natural protection from the encroachment by local populations. PKWS

overlaps the watershed of 3 major rivers: Lam Chee River, Lam Sifting River and Nam Phrom River.

However, the pressure on the park is increasing, due to the increase of the populations, the fragilization of the limits of the ecosystem due to timber collection and forest fires, and development project who threaten the integrity of the site.

Still, the area is in fairly good condition. The vegetation cover is degraded in some peripheral areas only, and the situation here is not as bad as to have yet severely degraded the core of the area. Several types of ecosystems are found in the park:

- Hill evergreen forest
- Dry evergreen forest
- Tropical rain forest (endangered as closest to human encroachment)
- Dipterocarp forest (most susceptible to fire)
 - * True dipterocarp forest
 - * Mixed pine (*Pinus kesiya*) and deciduous dipterocarp forest
- Bamboo forest
- Grasslands (both natural and anthropic)

This variety of habitats allow a large variety of wildlife to thrive in this area. The actual list of vertebrates includes the following number of families, genres and species:

	FAMILIES	GENUS	SPECIES
MAMMALS	25	47	57
BIRDS	44	145	223
REPTILES	12	21	28
AMPHIBIANS	6	8	15
FISH	11	20	26
TOTAL	98	241	349

This work is still preliminary and several new species have been found or recorded in the last few months.

Several of the species in PKWS are locally and internationally endangered. Some of the key species present in the area are:

- the Sumatran rhinoceros, *Dicerorhinus sumatrensis*, could still survive in the western and central parts of the WS. Footprints were seen one year ago.
- the status of the Fea's barking deer, *Muntiacus feae*, is unknown. This very rare species has been seen occasionally, and a skin is kept at the visitor's center in Nam Nao NP.
- the Sarus crane's, *Grus antigone*, last breeding grounds were in the WS. It has now completely disappeared from the area. The reason of this disappearance have not been studied.

- a small population of White-winged duck, *Cairina scutulata*, still nests in PKWS. It is one of the 3 sites where this species breeds in Thailand. Its numbers are unknown.
- The very rare Oriental darter, *Anhinga melanogaster*, still exists. PKWS could be the only remaining breeding site of this species in Thailand.
- The Siamese crocodile, *Crocodylus siamensis*, exists in the PKWS in 3 areas. Its habitat is lowland rivers, and thus in the most threatened areas in the WS, close to human populations. An existing project of dam on the Sifting river could destroy one of these 3 areas.

Other species considered as endangered such as Asian elephant, tiger, gaur, banteng, Asian wild dog, etc. are also present in the WS, in sustainable numbers.

Some protected botanic species also exist in the park, like for example *Sapria himalayana*.

LIST OF ANIMAL SPECIES PRESENT IN PHU KHIEO WILDLIFE SANCTUARY after the list compiled by PKWS staff.

Key to codes:

Population Level (in PKWS): 1 = Very rare; 2 = Uncommon; 3 = Common; 4 = Very common; (A) = localized in some habitats

Present status (in Thailand): C = Common resident ; U = Uncommon resident; (w) = Winter visitor; E = Endangered species; E* = Extinct; T = Threatened species; N = New record in Thailand; R = Rare resident.

Law status: 0 = no special status; P = Protected species; S = Strictly protected species (15 species in Thailand); * = reintroduced or feral;

LIST OF MAMMALS REPORTED IN PKWS

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
TUPAIIDAE				
Common Treeshrew	<i>Tupaia glis</i>	4	C	0
SORICIDAE				
Szechuan Burrowing Shrew	<i>Anourosorex squamipes</i>	1	U	0
Dwarf Shrew	<i>Crocidura etrusca</i>	1	U	0
TALPIDAE				
Eastern Mole	<i>Talpa micrura</i>	2	U	
PTEROPODIDAE				
Greater Short-nosed Fruit Bat	<i>Cynopterus sphinx</i>	2	U	0
Northern Tailless Fruit Bat	<i>Megaerops niphanae</i>	2	U	*
Leschenault's Rousette	<i>Rousettus leschenaulti</i>	3	C	0

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Greater Long-tongued Fruit Bat	<i>Macroglossus sobrinus</i>	2	U	P
Cave-dwelling Nectar-eating Bat	<i>Eonycteris spelaea</i>	1	N	P
MEGADERMATIDAE				
Greater False Vampire	<i>Megaderma lyra</i>	2	U	P
Lesser False Vampire	<i>Megaderma spasma</i>	2	U	P
RHINOLOPHIDAE				
Intermediate Horseshoe Bat	<i>Rhinolophus affinis</i>	3	C	P
Least Horseshoe Bat	<i>Rhinolophus pusillus</i>	3	C	P
Peters' Horseshoe Bat	<i>Rhinolophus coelophyllus</i>	2	U	P
North Malayan Horseshoe Bat	<i>Rhinolophus malayanus</i>	1	N	P
Bourret's Horseshoe Bat	<i>Rhinolophus paradoxolophus</i>	1	N	P
HIPPOSIDERDAE				
Shield-faced Roundleaf Bat	<i>Hipposideros lylei</i>	2	U	P
Great Roundleaf Bat	<i>Hipposideros armiger</i>	2	U	P
Dr.Boonsong's Roundleaf Bat	<i>Hipposideros lekaguli</i>	1	N	P
Intermediate Roundleaf Bat	<i>Hipposideros larvatus</i>	2	U	P
Malayan Tailless Roundleaf Bat	<i>Coelops robinsoni</i>	1	U	P
Tailless Roundleaf Bat	<i>Paracoelops sp.</i>	1	N	*
Trident-nosed Bat	<i>Aselliscus stoliczkanus</i>	2	U	P
VESPERTILLIONIDAE				
Whiskered Bat	<i>Myotis mystacinus</i>	2	U	P
Lesser Club-footed Bat	<i>Tylonycteris pachypus</i>	2	U	P
Greater Club-footed Bat	<i>Tylonycteris robustula</i>	2	U	P
Lesser Yellow Bat	<i>Scotophilus kuhlii</i>	2	U	P
Southeast Asian Bent-winged Bat	<i>Miniopterus medius</i>	1	N	P
Tube-nosed Bat	<i>Murina cyclotis</i>	2	N	P
Hardwicke's Bat	<i>Kerivoula hardwickei</i>	3	U	P
MOLOSSIDAE				
Wrinkled-lipped Bat	<i>Tadarida plicata</i>	1	N	P
LORISIDAE				
Slow Loris	<i>Nycticebus coucang</i>	2	C	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
CERCOPITHECIDAE				
Pig-tailed Macaque	<i>Macaca nemestrina</i>	3	T	P
Stump-tailed Macaque	<i>Macaca arctoides</i>	2	T	P
Rhesus Macaque	<i>Macaca mulatta</i>	3	T	P
Silvered Langur	<i>Presbytis cristata</i>	2	T	P
Phayre's Langur	<i>Presbytis phayrei</i>	3	T	P
HYLOBATIDAE				
White-handed Gibbon	<i>Hylobates lar</i>	4	E	P
MANIDAE				
Malayan Pangolin	<i>Manis javanica</i>	3	T	P
LEPORIDAE				
Siamese Hare	<i>Lepus peguensis</i>	2	C	P
SCIURIDAE				
Black Giant Squirrel	<i>Ratufa bicolor</i>	4	T	0
Variable Squirrel	<i>Callosciurus finlaysoni</i>	4	C	0
Cambodian Striped Tree Squirrel	<i>Tamias rodolphei</i>	3	C	0
Burmese Striped Tree Squirrel	<i>Tamias mccllellandi</i>	3	C	0
Indochinese Ground Squirrel	<i>Menetes berdmorei</i>	3	C	P
Red Giant Flying Squirrel	<i>Petaurista petaurista</i>	2	C	P
Particolored Flying squirrel	<i>Hylopetes alboniger</i>	2	C	P
RHIZOMYIDAE				
Large Bamboo Rat	<i>Rhizomys sumatrensis</i>	2	C	0
Hoary Bamboo Rat	<i>Rhizomys pruinosus</i>	2	C	0
Bay Bamboo Rat	<i>Cannomys badius</i>	2	C	0
MURIDAE				
Long-tailed Cane Mouse	<i>Vandeleuria oleracea</i>	2	U	0
Pencil-tailed Tree Mouse	<i>Chirpodomys gliroides</i>	2	U	0
Great Bandicoot	<i>Bandicota indica</i>	2	U	0
Fawn-colored Mouse	<i>Mus cervicolor</i>	2	U	0
Lesser White-toothed Rat	<i>Rattus berdmorei</i>	2	U	0
Yellow Rajah Rat	<i>Rattus surifer</i>	2	U	0
Chestnut Rat and Bonhote's Rat	<i>Rattus bukit</i>	3	U	0
Roof Rat	<i>Rattus rattus</i>	3	C	0
Noisy Rat	<i>Rattus sabanus</i>	3	C	0

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
HYSTRICIDAE				
Crestless Himalayan Porcupine	<i>Hystrix hodgsoni</i>	3	C	P
Bush-tailed Porcupine	<i>Atherurus macrourus</i>	2	C	P
CANIDAE				
Asiatic Jackal	<i>Canis aureus</i>	2	T	P
Asian Wild Dog	<i>Cuon alpinus</i>	4	E	P
URSIDAE				
Asiatic Black Bear	<i>Selenarctos thibetanus</i>	2	T	P
Malayan Sun Bear	<i>Helarctos malayanus</i>	3	T	P
MUSTELIDAE				
Back-Striped Weasel	<i>Mustela strigidorsa</i>	1	E	P
Yellow-throated Marten	<i>Martes flavigula</i>	3	C	P
Hog Badger	<i>Arctonyx collaris</i>	2	U	P
Burmese Ferret-badger	<i>Melogale personata</i>	2	U	P
Smooth-coated Otter	<i>Lutra perspicillata</i>	2	T	P
Small-clawed Otter	<i>Aonyx cinerea</i>	3	T	P
VIVERRIDAE				
Small Indian Civet	<i>Viverricula malaccensis</i>	3	C	P
Large Indian Civet	<i>Viverra zibetha</i>	4	C	P
Large-spotted Civet	<i>Viverra megaspila</i>	3	C	P
Spotted Linsang	<i>Prionodon pardicolor</i>	2	E	P
Three-striped Palm Civet	<i>Arctogalidia trivirgata</i>	2	C	0
Common Palm Civet	<i>Paradoxurus hermaphroditus</i>	4	C	0
Masked Palm Civet	<i>Paguma larvata</i>	3	C	0
Binturong	<i>Arctictis binturong</i>	1	T	P
Banded Palm Civet	<i>Hamigalus derbyanus</i>	1	E	P
Javan Mongoose	<i>Herpestes javanicus</i>	3	C	P
FELIDAE				
Fishing Cat	<i>Felis viverrina</i>	3	T	P
Leopard Cat	<i>Felis bengalensis</i>	3	T	P
Jungle Cat	<i>Felis chaus</i>	1	E	P
Asian Golden Cat	<i>Felis temmincki</i>	1	E	P
Clouded Leopard	<i>Neofelis nebulosa</i>	1	E	P
Leopard or Panther	<i>Panthera pardus</i>	2	E	P
Tiger	<i>Panthera tigris</i>	2	E	P
ELEPHANTIDAE				

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Asiatic or Indian Elephant	<i>Elephas maximus</i>	3	E	P
RHINOCEROTIDAE				
Sumatran Rhinoceros	<i>Dicerorhinus sumatrensis</i>	1	E	S
SUIDAE				
Common Wild Pig	<i>Sus scrofa</i>	4	C	0
TRAGULIDAE				
Lesser Mouse Deer	<i>Tragulus javanicus</i>	3	C	P
CERVIDAE				
Common Barking Deer	<i>Muntiacus muntjak</i>	4	C	P
Hog Deer	<i>Cervus porcinus</i>	2	E*	P
Sambar Deer	<i>Cervus unicolor</i>	4	C	P
BOVIDAE				
Wild Water Buffalo	<i>Bubalus bubalis</i>	1	E*	*
Banteng	<i>Bos javanicus</i>	1	E	P
Gaur	<i>Bos gaurus</i>	3	E	P
Serow	<i>Capricornis sumatraensis</i>	2	E	S

LIST OF BIRDS RECORDED IN PHU KHIEO WILDLIFE SANCTURARY

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
PODICIPEDIDAE				
Little Grebe	<i>Tachybaptus ruficollis</i>	3(A)	C	P
PHALACROCORA-CIDAE				
Grest Cormorant	<i>Phalacrocorax carbo</i>	1(A)	(w)	P
ANHINGIDAE				
Oriental Darter	<i>Anhinga melanogaster</i>	2(A)	E	P
ARDEIDAE				
Grey Heron	<i>Ardea cinerea</i>	1(A)	U(w)	P
Purple Heron	<i>Ardea purpurea</i>	2(A)	C(w)	P
Chinese Pone-Heron	<i>Ardeola bacchus</i>	3(A)	C(w)	P
Cattle Egret	<i>Bubulcus ibis</i>	1(A)	C(w)	P
Great Egret	<i>Egretta alba</i>	1(A)	C(w)	P
Little Egret	<i>Egretta garzetta</i>	2(A)	C(w)	P
Little Heron	<i>Butorides striatus</i>	3	C(w)	P
Black Bittern	<i>Dupetor flavicollis</i>	2	C(w)	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	1(A)	C(w)	P
Malayan Night-Heron	<i>Gorsachius melanolophus</i>	2(A)	U	P
Yellow Bittern	<i>Ixobrychus sinensis</i>	1(A)	C(w)	P
Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i>	2(A)	C(w)	P
PELECANIDAE				
Spot-billed Pelican	<i>Pelecanus philippensis</i>	1(A)*	E(w)	P
ANATIDAE				
Northern Pintail	<i>Anas acuta</i>	1(A)	C(w)	P
Garganey	<i>Anas querquedula</i>	1(A)	C(w)	P
Cotton Pygmy-Goose	<i>Nettapus coromandelianus</i>	1(A)	C(w)	P
White-winged Duck	<i>Cairina scutulata</i>	2(A)	E	P
Lesser Whistling-Duck	<i>Dendrocygna javanica</i>	4(A)	C	P
ACCIPITRIDAE				
Osprey	<i>Pendion haliaetus</i>	2	U(w)	P
Black-shouldered Kite	<i>Elanus caeruleus</i>	3	C	P
Jerdon's Baza	<i>Aviceda jerdoni</i>	1	U(w)	P
Black Baza	<i>Aviceda leuphotes</i>	2	U(w)	P
Crested Goshawk	<i>Accipiter trivirgatus</i>	3	C	P
Chinese Goshawk	<i>Accipiter soloensis</i>	1	U(w)	P
Shikra	<i>Accipiter badius</i>	3	C(w)	P
Besra	<i>Accipiter virgatus</i>	2	U	P
Japanese Sparrowhawk	<i>Accipiter gularis</i>	2	C(w)	P
Crested Honey - Buzzard	<i>Pernis ptilorhyncus</i>	1	U(w)	P
Common Buzzard	<i>Buteo buteo</i>	2	C(w)	P
Rufous-winged Buzzard	<i>Butastur liventer</i>	2	U	P
Grey-faced Buzzard	<i>Butastur indicus</i>	2	C(w)	P
Crested Serpent-Eagle	<i>Spilornis cheela</i>	3	C	P
Mountain Hawk-Eagle	<i>Spizaetus nipalensis</i>	2	U(w)	P
Rufous-bellied Eagle	<i>Hieraaetus kienerii</i>	2	U	P
Black Eagle	<i>Ictinaetus malayensis</i>	1	U	P
Greater Spotted Eagle	<i>Aquila clanga</i>	1	U(w)	P
Red-Headed Vulture	<i>Sarcogyps calvus</i>	1	E	P
White-rumped Vulture	<i>Gyps bengalensis</i>	1	E(w)	P
Eastern marsh-Harrier	<i>Circus spilonotus</i>	2	C(w)	P
Pied Harrier	<i>Circus melanoleucos</i>	2	U(w)	P
FALCONIDAE				
White-rumped Falcon	<i>Polihierax insignis</i>	2	U	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Collared Falconet	<i>Microhierax caerulescens</i>	3	U	P
Eurasian Kestrel	<i>Falco tinnunculus</i>	2	C(w)	P
Oriental Hobby	<i>Falco severus</i>	2	U	P
PHASIANIDAE				
Silver Pheasant	<i>Lophua nycthemera</i>	3	U	P
Siamese Fireback	<i>Lophura diardi</i>	3	E,U	P
Red Junglefowl	<i>Gallus gallus</i>	4	C	P
Grey Peacock-Pheasant	<i>Polyplectron bicalcaratum</i>	3	U	P
Green Peafowl	<i>Pavo muticus</i>	1(A)	E	P
Rufous-throated Partridge	<i>Arborophila rufogularis</i>	3	E,U	P
Bar-backed Partridge	<i>Arborophila brunneopectus</i>	3	U	P
Scaly-breasted Partridge	<i>Arborophila chloropus</i>	3	E,C	P
Chinese Francolin	<i>Francolinus pintadeanus</i>	2	C	P
Blue-breasted Quail	<i>Coturnix chinensis</i>	2	U	-
TURNICIDAE				
Yellow legged Buttonquail	<i>Turnix tanki</i>	3	C	-
Barred Buttonquail	<i>Turnix suscitator</i>	3	C	-
RALLIDAE				
Slaty-breasted Rail	<i>Rallus striatus</i>	2	C	P
Red-legged Crake	<i>Rallina fasciata</i>	2	C(w)	P
Ruddy-breasted Crake	<i>Porzana fusca</i>	2	C	P
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	3(A)	C	P
Watercock	<i>Gallicrex cinerea</i>	2(A)	C(w)	P
Common Moorhen	<i>Gallinula chloropus</i>	4(A)	C(w)	P
Purple Swampphen	<i>Porphyrio porphyrio</i>	1(A)	C	P
Eurasian Coot	<i>Fulica atra</i>	1(A)	U(w)	P
HELIORNITHIDAE				
Masked finfoot	<i>Heliopais personata</i>			
JACANIDAE				
Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	1	C(w)	P
CHARADRIIDAE				
Grey-headed Lapwing	<i>Vanellus cinereus</i>	2	C(w)	P
Red-wattled Lapwing	<i>Vanellus indicus</i>	2	C	P
River Lapwing	<i>Vanellus duvaucelii</i>	1-2	U	P
Little Ringed Plover	<i>Charadrius dubius</i>	1-2	C(w)	P
Kentish Plover	<i>Charadrius alexandrinus</i>	1	C(w)	P
SCOLOPACIDAE				

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Marsh Sandpiper	<i>Tringa stagnatilis</i>	2-1	C(w)	P
Green Sandpiper	<i>Tringa ochropus</i>	2-1	C(w)	P
Wood Sandpiper	<i>Tringa glareola</i>	3-2	C(w)	P
Common Sandpiper	<i>Actitis hypoleucos</i>	3-2	C(w)	P
Eurasian Woodcock	<i>Scolopax rusticola</i>	2	U(w)	P
Pintail Snipe	<i>Gallinago stemura</i>	3-2	C(w)	P
Common Snipe	<i>Gallinago gallinago</i>	2	C(w)	P
GLAREOLIDAE				
Oriental Pratincole	<i>Glareola maldivarum</i>	2	C(w)	P
Small Pratincole	<i>Glareola lactea</i>	2	U(w)	P
RECUVIROSTRIDAE				
Black-winged Stilt	<i>Himantopus himantopus</i>	1(A)	C(w)	P
COLUMBIDAE				
Thick-billed Pigeon	<i>Treron curvirostra</i>	4	C	P
Pompadour Pigeon	<i>Treon pompadora</i>	2	U	P
Green Imperial Pigeon	<i>Ducula aenea</i>	2	U	P
Mountain Imperial Pigeon	<i>Ducula badia</i>	3	C	P
Rock Pigeon	<i>Columba livia</i>	3	C	-
Barred Cuckoo-Dove	<i>Macropygia unchall</i>	3	C	P
Little Cuckoo-Dove	<i>Macropygia ruficeps</i>	2	U	P
Oriental Turtle-Dove	<i>Streptopelia orientalis</i>	2-3	U	P
Red Turtle-Dove	<i>Streptopelia Traquebarica</i>	2-3	C	P
Spotted Dove	<i>Streptopelia chinensis</i>	4	C	P
Zebra Dove	<i>Geopelia striata</i>	2	C	-
Emerald dove	<i>Chalcophaps indica</i>	4	C	P
PSITTACIDAE				
Red-breasted Parakeet	<i>Psittacula alexandri</i>	3-2	U	P
Grey-headed Parakeet	<i>Psittacula finschii</i>	2	U	P
Vernal Hanging Parrot	<i>Loriculus vernalis</i>	3-2	C	P
CUCULIDAE				
Chestnut-winged Cuckoo	<i>Clamator coromandus</i>	2	U(w)	P
Large Hawk-Cuckoo	<i>Cuculus sparveroides</i>	3	C	P
Indian-Cuckoo	<i>Cuculus micropterus</i>	3	C	P
Banded Bay Cuckoo	<i>Cacomantis sonneratii</i>	3-2	U	P
Plaintive Cuckoo	<i>Cacomantis merulinus</i>	2-3	C	P
Asian Emerald Cuckoo	<i>Chrysococcyx maculatus</i>	3-2	U(w)	P
Common Koel	<i>Eudynamis scolopacea</i>	2	C	P
Green-billed Malkoha	<i>Phaenicophaeus tristis</i>	4	C	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Coral-billed Ground Cuckoo	<i>Carpococcyx renauldi</i>	3	E	P
Greater Coucal	<i>Centropus sinensis</i>	4	C	P
Lesser Coucal	<i>Centropus bengalensis</i>	3	C	P
STRIGIDAE				
Barn Owl	<i>Tyto alba</i>	2-3	C	P
Bay Owl	<i>Phodilus badius</i>	3	U	P
Brown Hawk-Owl	<i>Ninox scutulata</i>	4	C	P
Mountain Scops-Owl	<i>Otus spilocephalus</i>	3-2	C	P
Oriental Scops-Owl	<i>Otus sunia</i>	2	U	P
Collared Scops-Owl	<i>Otus lempiji</i>	4-3	C	P
Collared Owlet	<i>Glaucidium brodiei</i>	3	C	P
Asian Barred Owlet	<i>Glaucidium cuculoides</i>	3	C	P
Spotted Owlet	<i>Athene brama</i>	2	C	P
Brown fish-Owl	<i>Ketupa zeylonensis</i>	2	U	P
Brown Wood-Owl	<i>Strix leptogrammica</i>	3-2	U	P
CAPRIMULGIDAE				
Great Bared Nightjar	<i>Eurostopodus macrotis</i>	3	C	P
Grey Nightjar	<i>Caprimulgus indicus</i>	3-2	C(w)	P
Large-tailed Nightjar	<i>Caprimulgus macrurus</i>	3-2	C	P
Indian Nightjar	<i>Caprimulgus asiaticus</i>	3-2	C	P
Savanna Nightjar	<i>Caprimulgus affinis</i>	3	C	P
TROGONIDAE				
Orange-breasted Trogon	<i>Harpactes oreskios</i>	3-4	C	P
Red-headed Trogon	<i>Harpactes erythrocephalus</i>	3-4	C	P
ALCEDINIDAE				
Pied Kingfisher	<i>Ceryle rudis</i>	1(A)	C	P
Common Kingfisher	<i>Alcedo atthis</i>	4(A)	C(w)	P
Blue-eared Kingfisher	<i>Alcedo meninting</i>	2(A)	U	P
Oriental Dwarf Kingfisher	<i>Ceyx erithacus</i>	2(A)	U	P
Banded Kingfisher	<i>Lacedo pulchella</i>	1(A)	C	P
Stork-billed Kingfisher	<i>Halcyon copensis</i>	(A)	U	P
Ruddy Kingfisher	<i>Halcyon coromanda</i>	1(A)	U(w)	P
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	4-3(A)	C	P
Black-capped Kingfisher	<i>Halcyon pileata</i>	3(A)	C(w)	P
MEROPIDAE				
Chestnut-headed Bee-eater	<i>Merops leschenaulti</i>	4-3	C	P
Bule-tailed Bee-eater	<i>Merops philippinus</i>	3-2	C	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Green Bee-eater	<i>Merops orientalis</i>	3	C	P
Blue-Throated Bee-eater	<i>Merops viridis</i>	1-2	U(w)	P
Red-bearded Bee-eater	<i>Nyctyornis amictus</i>	1	C	P
Blue-bearded Bee-eater	<i>Nyctyornis athertoni</i>	3-2	C	P
CORACIIDAE				
Indian Roller	<i>Caracias benghalensis</i>	4	C	P
Dollarbird	<i>Eurystomus orientalis</i>	3	C	P
UPUPIDAE				
Hoopoe	<i>Upupa epops</i>	3	C	P
BUCEROTIDAE				
Brown Hornbill	<i>Ptilolaemus tickelli</i>	3-4	U	P
Wreathed Hornbill	<i>Rhyticeros undulatus</i>	3	U	P
Oriental Pied Hornbill	<i>Anthracoceros albirostris</i>	4	C	P
Great Hornbill	<i>Buceros bicornis</i>	2	U	P
MEGALAIMIDAE				
Great Barbet	<i>Megalaima virens</i>	4	C	P
Lineated Barbet	<i>Megalaima lineata</i>	3	C	P
Green-eared Barbet	<i>Megalaima Faiostriata</i>	3	C	P
Blue-Throated Barbet	<i>Megalaima asiatica</i>	3	C	P
Moustached Barbet	<i>Megalaima incognita</i>	2	C	P
Blue-eared Barbet	<i>Megalaima australis</i>	4	C	P
Coppersmith Barbet	<i>Megalaima haemacephala</i>	4	C	P
PICIDAE				
Eurasian Wryneck	<i>Jynx torquilla</i>	2	C(w)	P
Speckled Piculet	<i>Picumnus innominatus</i>	3-2	C	P
White-browed Piculet	<i>Sasia ochracea</i>	3-2	C	P
Greater Flameback	<i>Chrysocolaptes lucidus</i>	3	C	P
Common Flameback	<i>Dinopium javanense</i>	3	C	P
Laced Woodpecker	<i>Picus vittatus</i>	3	C	P
Grey-headed Woodpecker	<i>Picus canus</i>	3-2	U	P
Black-headed Woodpecker	<i>Picus erythropygius</i>	3-2	U	P
Greater Yellownape	<i>Picus flavinucha</i>	3	C	P
Lesser Yellownape	<i>Picus chlorolophus</i>	3	C	P
Rufous Woodpecker	<i>Celeus brachyurus</i>	3-4	C	P
Bay Woodpecker	<i>Blythipicus pyrrhotis</i>	2	U	P
Great Slaty Woodpecker	<i>Muelleripicus pulverulentus</i>	3	U	P
White-bellied Woodpecker	<i>Dryocopus javensis</i>	3	U	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Black-and-Buff Woodpecker	<i>Meiglyptes jugularis</i>	3-2	U	P
Heart-spotted Woodpecker	<i>Hemicircus canente</i>	3-2	C	P
Grey-capped Woodpecker	<i>Picoides canicapillus</i>	3	C	P
EURLAIMIDAE				
Dusky Broadbill	<i>Corydon sumatramus</i>	2	U	P
Banded Broadbill	<i>Eurlaimus Javanicus</i>	3-2	U	P
Silver-breasted Broadbill	<i>Serilophus lunatas</i>	3-2	C	P
Long-tailed Broadbill	<i>Psarisomus dalhousiae</i>	3-2	C	P
PITTIDAE				
Rusty-naped Pitta	<i>Pitta oatesi</i>	2(A)	U	P
Blue-winged Pitta	<i>Pitta moluccensis</i>	3-2	C(w)	P
Blue Pitta	<i>Pitta cyanea</i>	4	C	P
Eared Pitta	<i>Pitta phayrei</i>	2(A)	U	P
APODIDAE				
Himalayan Swiftlet	<i>Aerodramus brevirostris</i>	2	C(w)	P
Asian Palm-Swift	<i>Cypsiurus balasiensis</i>	3-4	C	P
Pacific Swift	<i>Apus pacificus</i>	2	U(w)	P
House Swift	<i>Apus affinis</i>	3-2	C	P
Brown Needletail	<i>Hirundapus giganteus</i>	2	C	P
HEMIPROCNIIDAE				
Crested Treeswift	<i>Hemiprocne coronata</i>	3-4	C	P
HIRUNDINIDAE				
Sand Martin	<i>Riparia riparia</i>	2	C(w)	P
Dusky Crag-Martin	<i>Hirundo concolor</i>	2-3	C	P
Barn Swallow	<i>Hirundo rustica</i>	4-3	C(w)	P
Red-rumped Swallow	<i>Hirundo daurica</i>	3	C(w)	P
Common House-Martin	<i>Delichon urbica</i>	1	R(w)	P
ALAUDIDAE				
Rufous-winged Bushlark	<i>Mirafra assamica</i>	2	C	P
MOTACILLIDAE				
Olive-backed Pipit	<i>Anthus hodgsoni</i>	2-3	C(w)	P
Richard's Pipit	<i>Anthus novaeseelandiae</i>	3	C	P
Red-Throated Pipit	<i>Anthus cervinus</i>	3-4	C(w)	P
White Wagtail	<i>Motacilla alba</i>	3-4	C(w)	P
Gray Wagtail	<i>Motacilla cinerea</i>	4	C(w)	P
Yellow Wagtail	<i>Motacilla flava</i>	3	C(w)	P
Forest Wagtail	<i>Dendronanthus indicus</i>	4	C(w)	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
CAMPEPHAGIDAE				
Bar-winged Flycatcher-shrike	<i>Hemipus picatus</i>	4	C	P
Large Wood-shrike	<i>Tephrodornis virgatus</i>	4-3	C	P
Common wood-shrike	<i>Tephrodornis pondicerianus</i>	4-3	C	P
Large Cuckoo-shrike	<i>Coracina macei</i>	3	C	P
Indochinese Cuckoo-shrike	<i>Coracina poliota</i>	3	C	P
Black-winged Cuckoo-shrike	<i>Coracina melaschista</i>	3	C	P
Ashy Minivet	<i>Pericrocotus divaricatus</i>	3	C(w)	P
Rosy Minivet	<i>Pericrocotus roseus</i>	3	C(w)	P
Small Minivet	<i>Pericrocotus cinnamomeus</i>	3	C	P
Grey-chinned Minivet	<i>Pericrocotus solaris</i>	3	C	P
Short-billed Minivet	<i>Pericrocotus brevirostris</i>	1	C	P
Long-tailed Minivet	<i>Pericrocotus ethologus</i>	3	C	P
Scarlet Minivet	<i>Pericrocotus flammeus</i>	3-4	C	P
CHLOROPSEIDAE				
Green Iora	<i>Aegithina viridissima</i>	3	U	P
Common Iora	<i>Aegithina tiphia</i>	4	C	P
Great Iora	<i>Aegithina lafresnayei</i>	4	C	P
Golden-fronted Leafbird	<i>Chloropsis aurifrons</i>	4	C	P
Blue-winged Leafbird	<i>Chloropsis cochinchinensis</i>	4	C	P
Orange-bellied Leafbird	<i>Chloropsis hardwickii</i>	3	C	P
PYCNONOTIDAE				
Striated Bulbul	<i>Pycnonotus striatus</i>	3-2	C	P
Black-headed Bulbul	<i>Pycnonotus atriceps</i>	3	C	P
Black-crested Bulbul	<i>Pycnonotus melanicterus</i>	4	C	P
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	4	C	P
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	4	C	P
Stripe-throated Bulbul	<i>Pycnonotus finlaysoni</i>	4	C	P
Strieak-eared Bulbul	<i>Pycnonotus blanfordi</i>	4	C	P
Puff-throated Bulbul	<i>Criniger pallidus</i>	4-3	C	P
Gray-eyed Bulbul	<i>Hypsipetes propinquus</i>	4	C	P
Mountain Bulbul	<i>Hypsipetes mccllellandii</i>	3	C	P
Ashy Bulbul	<i>Hypsipetes flavala</i>	3	C	P
Black Bulbul	<i>Hypsipetes madagascariensis</i>	3	C	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
DICRURIDAE				
Black Drongo	<i>Dicrurus macrocercus</i>	3-2	C	P
Ashy Drongo	<i>Dicrurus leucophaeus</i>	4	C	P
Crow-billed Drongo	<i>Dicrurus annectans</i>	3	U(w)	P
Bronzed Drongo	<i>Dicrurus aeneus</i>	3	C	P
Lesser Racket-tailed Drongo	<i>Dicrurus remifer</i>	3	C	P
Haie-crested Drongo	<i>Dicrurus hottentottus</i>	2	C	P
Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	3	C	P
ORIOLIDAE				
Black-naped Oriole	<i>Oriolus chinensis</i>	4	C(w)	P
Slender-billed Oriole	<i>Oriolus temuirostris</i>	3	C(w)	P
Black-hooded Oriole	<i>Oriolus xanthornus</i>	3	C	P
Maroon Oriole	<i>Oriolus traillii</i>	3-2	C	P
IRENIDAE				
Asian Fairy-bluebird	<i>Irena puella</i>	4	C	P
CORVIDAE				
Eurasian Jay	<i>Garrulus glandarius</i>	3	C	-
Green Magpie	<i>Cissa chinensis</i>	3	C	P
Blue Magpie	<i>Urocissa erythrorhyncha</i>	4	U	P
Rufous Treepie	<i>Dendrocitta vagabunda</i>	3	U	P
Grey Treepie	<i>Dendrocitta formosae</i>	3	C	P
Large-billed Crow	<i>Corvus macrorhynchos</i>	2	C	P
AEGITHALIDAE				
Great Tit	<i>Parus major</i>	2	U	P
Yellow-cheeked Tit	<i>Parus spilonotus</i>	2	C	P
Sultan Tit	<i>Melanochlora sultanea</i>	4	U	P
SITTIDAE				
Chestnut-bellied Nuthatch	<i>Sitta castanea</i>	3	U	P
Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	4	C	P
TIMALIIDAE				
Puff-throated Babbler	<i>Pellorneum ruficeps</i>	4	C	P
Buff-breasted Babbler	<i>Trichastoma tickelli</i>	3	C	P
Large Scimitar Babbler	<i>Pomatorhinus hypoleucos</i>	3	C	P
White-browed Scimitar Babbler	<i>Pomatorhinus schisticeps</i>	3-4	C	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Red-billed Scimitar Babbler	<i>Pomatorhinus ochraceiceps</i>	3	U	P
Grey-throated Babbler	<i>Stachyris nigriceps</i>	3-4	C	P
Striped Tit-Babbler	<i>Macronous gularis</i>	4	C	P
Chestnut-capped Babbler	<i>Timalia pileata</i>	3	C	P
Yellow-eyed Babbler	<i>Chrysomma sinense</i>	3	C	P
White-crested Laughingthrush	<i>Garrulax leucolophus</i>	4	C	P
Lesser Necklaced Laughingthrush	<i>Garrulax monileger</i>	3	C	P
White-necked Laughingthrush	<i>Garrulax strepitans</i>	3	C	P
Black-throated Laughingthrush	<i>Garrulax chinensis</i>	3	C	P
Brown-cheeked Fulvetta	<i>Aicippe poioicephala</i>	3	C	P
Gray-cheeked Fulvetta	<i>Aicippe morrisonia</i>	3-4	C	-
White-bellied Yuhina	<i>Yuhina zantholeuca</i>	4-3	C	-
Chestnut-fronted Shrike-Babbler	<i>Pteruthius aenobarbus</i>	2	C	P
White-hooded Babbler	<i>Gampsorhynchus rufulus</i>	3	U	P
SYLVIIDAE				
Golden-spectacled Warbler	<i>Seicercus burkii</i>	4-3	C(w)	P
Yellow-bellied Warbler	<i>Abroscopus superciliaris</i>	4	C	P
Dusky Warbler	<i>Phylloscopus fuscatus</i>	4	C(w)	P
Radde's Warbler	<i>Phylloscopus schwarzi</i>	4	C(w)	P
Pale-legged Leaf-Warbler	<i>Phylloscopus tenellipes</i>	4-3	C(w)	P
Arctic Warbler	<i>Phylloscopus borealis</i>	4-3	C(w)	P
Two-barred Warbler	<i>Phylloscopus plumbeitarsus</i>	3	C(w)	P
Greenish Warbler	<i>Phylloscopus trochiloides</i>	3	C(w)	P
Eastern Crowned Warbler	<i>Phylloscopus coronatus</i>	3-4	C(w)	P
Blyth's Leaf-Warbler	<i>Phylloscopus reguloides</i>	4-3	C(w)	P
White-tailed Leaf-Warbler	<i>Phylloscopus davisoni</i>	4-3	C	P
Sulphur-breasted Warbler	<i>Phylloscopus ricketti</i>	3	C(w)	P
Inornate warbler	<i>Phylloscopus inornatus</i>	4	C(w)	P
Lemon-rumped Warbler	<i>Phylloscopus proregulus</i>	3	U	P
Thick-billed Warbler	<i>Acrocephalus aedon</i>	3	C(w)	P
Great Reed-Warbler	<i>Acrocephalus arundinaceus</i>	3	C(w)	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Black-browed Reed-Warbler	<i>Acrocephalus bistrigiceps</i>	3	C(w)	P
Pallas's Grasshopper-Wabler	<i>Locustella certhiola</i>	2	C(w)	P
Lanceolated Warbler	<i>Locustella lanceolata</i>	3	C(w)	P
Zitting Cisticola	<i>Cisticola juncidis</i>	3	C	P
Bright-capped Cisticola	<i>Cisticola exilis</i>	2	C	P
Gray-breasted Prinia	<i>Prinia hodgsonii</i>	3	C	P
Rufescent Prinia	<i>Prinia rufescens</i>	4-3	C	P
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	3-4	C	P
Plain Prinia	<i>Prinia inornata</i>	3-4	C	P
Brown Prinia	<i>Prinia polychroa</i>	3	U	P
Hill Prinia	<i>Prinia atrogularis</i>	2	C	P
Common Tailorbird	<i>Orthotomus sutorius</i>	3-4	C	P
Dark-necked Tailorbird	<i>Orthotomus atrogularis</i>	4	C	P
Stub-tailed Bush-Warbler	<i>Cettia squameiceps</i>	3	U(w)	P
TURDIDAE				
Siberian Rubythroat	<i>Luscinia calliope</i>	3	C(w)	P
Bluethroat	<i>Luscinia svecica</i>	3	C(w)	P
Siberian Blue Robin	<i>Luscinia cyane</i>	3-4	C(w)	P
Oriental Magpie-Robin	<i>Copsychus saularis</i>	4	C	P
White-rumped Shama	<i>Copsychus malabaricus</i>	4	C	P
White-tailed Robin	<i>Cinclidium leucurum</i>	3	U	P
Slaty-backed Forktail	<i>Enicurus schistaceus</i>	4	C	P
White-crowned Forktail	<i>Enicurus leschenaulti</i>	3	C	P
Stonechat	<i>Saxicola torquata</i>	3	C(w)	P
Pied Bushchat	<i>Saxicola caprata</i>	3	C	P
Gray Bushchat	<i>Saxicola ferrea</i>	3-2	C(w)	P
Blue Rock-Thrush	<i>Monticola solitarius</i>	3	C(w)	P
Blue Whistling Thrush	<i>Myiophonus caeruleus</i>	3-4	C	P
Orange-headed Thrush	<i>Zoothera citrina</i>	3	U(w)	P
Eyebrowed Thrush	<i>Turdus obscurus</i>	3-4	C(w)	P
MUSCICAPIDAE				
Dark-sided Flycatcher	<i>Muscicapa sibirica</i>	3-4	C(w)	P
Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	3-4	C(w)	P
Red-throated Flycatcher	<i>Ficedula parva</i>	3-4	C(w)	P
Gray-headed Flycatcher	<i>Culicicapa ceylonensis</i>	4-3	C	P
Blue-and-White Flycatcher	<i>Cyanoptila cyanomelana</i>	3	U(w)	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Verditer Flycatcher	<i>Eumyias thalassina</i>	4-3	C	P
Hainan Blue Flycatcher	<i>Cyornis hainana</i>	3	C	P
Hill Blue Flycatcher	<i>Cyornis banyumas</i>	4	C	P
Tickell's Blue Flycatcher	<i>Cyornis tickelliae</i>	3	C	P
RHIPIDURIDAE				
White-throated Fantail	<i>Rhipidura albicollis</i>	4-3	C	P
Pied Fantail	<i>Rhipidura javanica</i>	3-4	C	P
MONARCHIDAE				
Black-naped Monarch	<i>Hypothymis azurea</i>	4	C	P
Asian Paradise-Flycatcher	<i>Terpsiphone paradisi</i>	3-4	C	P
LANIIDAE				
Brown Shrike	<i>Lanius cristatus</i>	3	C(w)	P
Tiger Shrike	<i>Lanius tigrinus</i>	1	C(w)	P
Burmese Shrike	<i>Lanius collurioides</i>	4	C(w)	P
Grey-backed Shrike	<i>Lanius tephronotus</i>	2	U(w)	P
Long-tailed shrike	<i>Lanius schach</i>	3-2	C	P
ARTAMIDAE				
Ashy Wood-swallow	<i>Artamus fuscus</i>	4-3	C	P
STURNIDAE				
Chestnut-tailed Starling	<i>Sturnus malabaricus</i>	1-2	C(w)	P
White-Shouldered Starling	<i>Sturnus sinensis</i>	1-2	C(w)	P
Asian Pied starling	<i>Sturnus contra</i>	1-2	C	P
Black-collared Starling	<i>Sturnus nigricollis</i>	2	C	P
Vinous-breasted Starling	<i>Sturnus burmannicus</i>	2-1	U	P
Common Myna	<i>Acridotheres tristis</i>	2	C	P
White-vented Myna	<i>Acridotheres javanicus</i>	2	C	P
Golden-Crested Myna	<i>Ampriceps coronatus</i>	3	U	P
Hill Myna	<i>Gracula religiosa</i>	4-3	U	P
NECTARINIIDAE				
Ruby-cheeked Sunbird	<i>Anthreptes singalensis</i>	3	C	P
Olive-backed Sunbird	<i>Nectarinia jugularis</i>	3-4	C	P
Purple Sunbird	<i>Nectarinia asiatica</i>	3	C	P
Black-throated Sunbird	<i>Aethopyga saturata</i>	3	C	P
Little Spiderhunter	<i>Arachnothera longirosta</i>	3-4	C	P
Streaked Spiderhunter	<i>Arachnothera magna</i>	3-4	C	P
DICAEIDAE				
Thick-billed Flowerpecker	<i>Dicaeum agile</i>	3-4	C	P

COMMON NAME	SCIENTIFIC NAME	POP. LEVEL	PRESENT STATUS	LAW STATUS
Yellow-vented Flowerpecker	<i>Dicaeum chrysorrheum</i>	3	C	P
Plain Flowerpecker	<i>Dicaeum concolor</i>	4	C	P
Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	3	C	P
Buff-bellied Flowerpecker	<i>Dicaeum ignipectus</i>	4-3	C	P
ZOSTEROPIDAE				
Chestnut-flanked White-eye	<i>Zosterops erythroleucus</i>	4-3	C(w)	P
Japanese White-eye	<i>Zosterops japonicus</i>	3-2	C(w)	P
Oriental White-eye	<i>Zosterops palpebrosus</i>	4-3	C	P
PASSERIDAE				
Eurasian Tree-Sparrow	<i>Passer montanus</i>	2-1	C	-
Plain-backed-Sparrow	<i>Passer flaveolus</i>	2	C	-
ESTRILDIDAE				
White-rumped Munia	<i>Lonchura striata</i>	2-1	C	P
Scaly-breasted Munia	<i>Lonchura punctulata</i>	2-1	C	P
FRINGILLIDAE				
Yellow-billed Grosbeak	<i>Eophona migratoria</i>	1	N(w)	P
EMBEREZIDAE				
Yellow-breasted Bunting	<i>Emberiza aureola</i>	2	C(w)	P
Chestnut Bunting	<i>Emberiza rutila</i>	3	C(w)	P

LIST OF REPTILES RECORDED IN PHU KHIEO WILDLIFE SANCTUARY

This list is not available at the moment

LIST OF AMPHIBIANS RECORDED IN PHU KHIEO WILDLIFE SANCTUARY

FAMILY NAME	SCIENTIFIC NAME
PELOBATIDAE	
	<i>Leptobranchium hasseltii</i>
	<i>Leptoplax delodytoides</i>
	<i>Megophrys parva</i>
BUFONIDAE	
	<i>Bufo macrotis</i>
	<i>Bufo melanostictus</i>
RANIDAE	
	<i>Occidozga lima</i>

	<i>Phrynoglossus martensi</i>
	<i>Rana erythraea</i>
	<i>Rana kuhli</i>
	<i>Rana lateralis</i>
	<i>Rana limnocharis</i>
	<i>Rana macrodactyla</i>
	<i>Rana microvittata</i>

1.4.2 Administrative organization and management of PKWS

1.4.2.1 Organigramme

PKWS headquarters is situated inside the wildlife sanctuary, at Tung Kramang, a former village.

The administrative structure of the wildlife sanctuary includes the Director's Office, 5 sections, and 6 protection centers. The 5 sections are:

Natural Resources Management Section (NRMS): This section deals with the compilation of information on the biological systems of PKWS.

Extension and Information Section (EIS): This section deals with the visitors, and the providing of information on PKWS. It is also in charge of the environment education programme in the schools and the centers around PKWS.

Administrative Section (ADMS): It deals with the management of the staff, the budget, the reporting, and all day-to-day activities of PKWS.

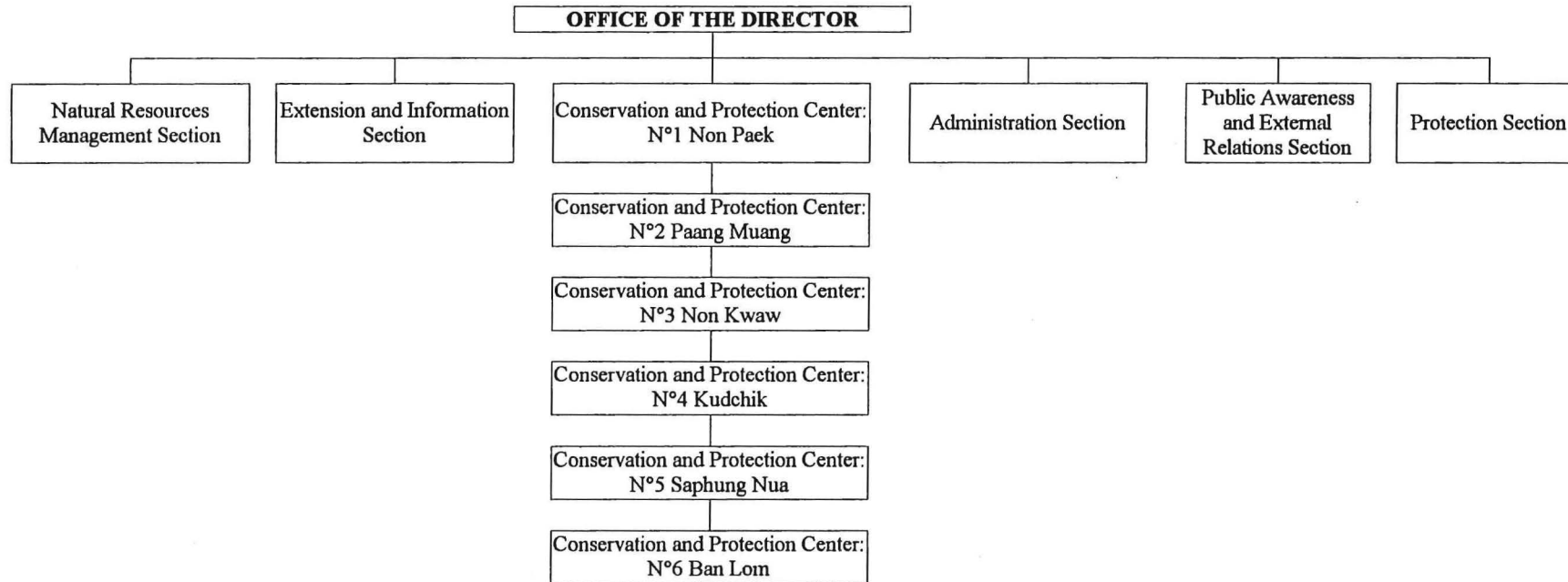
Public Awareness and External Relations Section (PAERS) This section deals mostly with the relationships with the people living in the buffer zone of the park.

Protection Section (PS): It deals with the intervention and control of the PKWS. Its teams are in charge of the police and surveillance of the wildlife sanctuary, the operation activities when a problem arises.

The Protection Centers and Units: The 6 centers and 15 units are situated around the eastern and southern boundaries of the wildlife sanctuary. Their role is mostly information gathering, patrolling the boundaries, and controlling the access to PKWS. Their police role is limited, and when a problem occurs, they request the intervention of the Protection section teams.

The organigramme of PKWS can be summarized as follows:

ORGANISATION CHART OF PHU KHIEO WILDLIFE SANCTUARY



1.4.2.2 Staff organization

The staff of PKWS can be divided in 3 categories: Officers, rangers and workers.

SITE	STRUCTURE	OFFICERS	RANGERS	WORKERS	TOTAL
Tung Kamang	Headquarters	7	24	80	111
Nong Paek	Center N°1		1	10	11
Tung Kamang	Unit 1.1		1	4	5
Bung Paen	Unit 1.2		2	7	9
Paang Muang	Center N°2		3	16	19
Sala Phrom	Unit 2.1		1	7	8
Phrom Song	Unit 2.2		2	6	8
Nong Raikai	Unit 2.3		1	9	10
Non Khwaw	Center N°3		2	13	15
Kaeng Tad Sai	Unit 3.1		1	9	10
Ta Dua	Unit 3.2		1	8	9
Kud Loh	Unit 3.3		1	9	10
Kudjik	Center N°4		3	12	15
Chanwan	Unit 4.1		2	9	11
Kaw Noi	Unit 4.2		2	10	12
Lad Nok Chaw	Unit 4.3		1	6	7
Saphung Nua	Center N°5		3	10	13
Nong Nok Ok	Unit 5.1		1	11	12
Huai Klam	Unit 5.2		2	7	9
Ban Lon	Center N°6		3	13	16
Klong Chareun	Unit 6.1		1	9	10
Non Srisanga	Unit 6.2		1	7	8
TOTAL		7	59	272	338

The rangers include 48 field rangers, 10 drivers (5 in the Conservation and Protection Centers and 5 in the Headquarters), and one administrative employee (employed by RFD). The workers are mostly laborers, and are recruited within the populations around PKWS.

The 7 officers are in charge of the management and control of the various sections. They are:

NAME	ROLE	GRADE
Mr. Nippon Sangwanyat	Director	6
Mr. Pakkorn Kaikeow	Chief of Administration section	5
Mr. Wichit Intharatsongkhroh	Chief of Protection section	5

Mr. Chaiyaporn Thapthimthong	Chief of Extension and Information section	4
Mr. Wanchanok Sukwannakorn	Chief of Public Awareness and External Relation section	4
Mr. Kittti Kreetiyutanont	Chief Natural Resources Section	4
Mr. Ratchaporn Phayungsin	Assistant to Head of Administration Section	3

1.4.2.3 Equipment

PKWS is under equipped with some basic equipment, such as:

Radio and guns

SITE	GUNS		RADIO EQUIPMENT		
	SHOTGUNS	HK33	BASE STATION	HANDSET	MOBILE
Tung Kamang	6	6	2	2	5
Nong Paek					
Tung Kamang					
Bung Paen	3	1			
Paang Muang	3	3	1		
Sala Phrom	4			1	
Phrom Song	4	1		1	
Nong Raikai	3				
Non Khwaw	4	2	1	1	
Kaeng Tad Sai	2				
Ta Dua	2				
Kud Loh	1	1		1	
Kudjik	4	3		1	
Chanwan	3				
Kaw Noi	3				
Lad Nok Chaw	3				
Saphung Nua	4	3		1	
Nong Nok Ok	3				
Huai Klam	2				
Ban Lon	3	3	1		
Klong Chareun	3				
Non Srisanga	4				
TOTAL	64	23	5	8	5

HQ: 2 base stations: 1 VHF, 1 HF

Much of the equipment is old, and sometimes staff use their own personal equipment to compensate for the lack of equipment.

1.4.2.4 Annual budget

The annual budget of the park is attributed annually by RFD. The salaries of the Officers and the Rangers are paid directly by the Staff department in Bangkok, the salaries of the workers and the running costs are under the responsibility of PKWS Administration Section.

ANNUAL BUDGET OF PHU KHIEO WILDLIFE SANCTUARY 1997

DESIGNATION	TOTAL (Bahts)	TOTAL (ECUs)
Salaries of officers	911,880	30,396
Salaries of rangers	354,800	11,827
Salaries of staff	12,495,600	416,520
Operating costs	3,328,000	110,933
Electricity, water, communication	14,400	480
Investments and equipment	3,855,900	128,530
TOTAL	20,960,580	698,686

1.4.2.5 Infractions

The list of infractions dealt with by PKWS staff has been the following since 1991.

RECORD OF INFRACTIONS AT PHU KHIEO WILDLIFE SANCTUARY

	YEAR						
	1991	1992	1993	1994	1995	1996	1997 (*)
N° OF INFRACTIONS	70	176	94	73	42	30	13
N° PEOPLE INVOLVED	74	278	121	111	50	41	16
CONFISCATED WOOD							
N° of boards	302	399	497	270	228	92	72
Volume	11.1	30	35.3	17.2	6	9.5	4.2
CONFISCATED GOODS							
FOREST PRODUCTS							
N° of Species	3	4	2	5	0	1	0
Weight	169.7	96	10	183.5	0	96	0
LIVE ANIMALS							

	N° of Species	1	2	3	2	0	0	0
	N° of animals	1	11	13	8	0	0	0
CARCASSES								
	N° of Species	5	10	6	3	14	10	1
	N° of pieces		4		37	63		
	N° of animals	10	30	15			4	1
	Weight		29		83.8	50.8	4.5	2.2
EQUIPMENT								
	Chainsaws	8	0	1	1	2	0	0
	Saws	16	65	34	38	10	9	11
	Knives	33	122	36	37	24	22	8
	Axes	12	25	14	22	6	4	1
	Guns	15	40	12	19	24	11	9
VEHICLES								
	Pushcart	0	10	17	13	6	2	2
	Bicycle	0	2	0	0	1	0	0
	Truck	0	3	2	2	0	0	0
AREA DESTROYED (RAIS)				7				

1997 (*) From January to May only

The decrease of infractions is due to the relative success of the public relation campaign by PKWS staff in the buffer zone, but it has to be tempered by the fact that the Conservation and Protection Centers and Units may not be as efficient and motivated as they should be. Political pressure in some areas, and threats for the safety of RFD staff in others, have a very negative influence on the success rate.

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