

**Regional Environmental Technical Assistance 5771
Poverty Reduction & Environmental Management in Remote Greater Mekong Subregion
(GMS) Watersheds Project (Phase I)**



BIODIVERSITY AND PROTECTED AREAS

Cambodia

By

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1. BACKGROUND

1.1 Country profile

Cambodia lies in southern Indochina between latitudes 10⁰25' and 14⁰35' N, and longitudes 102⁰20' and 107⁰35' E. Its area is 181,000 km². Elevations range from sea level to 1,771 metres on Phnom Aural about 60 km west-north-west of the capital Phnom Penh. Two thirds of the country are low lying plains bordered to the east by the Annamite Range, to the south-west by the Elephant and Cardamom Ranges and to the north by the Dangrek Mountains.

Cambodia's neighbours are Thailand to the northwest, Lao to the north and Viet Nam to the east and south. In the south-west a 435 km coastal strip abuts the Gulf of Thailand, where there are some offshore islands. The country is divided into 21 administrative provinces.

The climate is dominated by the southwest monsoon, which blows from May to September, producing an average annual rainfall of 2,300 mm, and the dry northeast monsoon from October to April. Higher rainfalls of over 6,000 mm have been recorded in the Cardamom Mountains. Mean temperature during December to January is about 20⁰C, and during April to May (the hottest months) 36⁰C.

Wetlands cover 30 per cent of Cambodia, of which the principal ones are the Mekong River and its environs, and the lake of Tonlé Sap with its surrounding swamp forests. The Mekong crosses the country from the Lao border in the north to Viet Nam in the south. Most of the country drains into the Mekong.

The human population of 11 million, based upon estimates made in March 1998, suggested a mean population density of 61/ km². Extrapolating from population data for 1994 to 1997 (in a Ministry of Tourism brochure), the annual rates of increase were 3.27, 4.00 and 4.66 per cent. These unexpectedly high figures are influenced presumably by inward migration. The 1999 population may therefore be closer to 12 million (66.3/ km²).

Forest and woodland covers an estimated 62 per cent of the land, a higher proportion than in any other country of the GMS although this represents a sizeable decrease from 73 per cent before 1973. The decrease has its origins in agricultural expansion, timber extraction and war; and it has been estimated that a further 3 million ha (30,000 km²) of forest have become degraded and lost most of their commercial worth although they may still function as environmentally viable forest ecosystems. The Department of Forestry and Wildlife (DFW) admits an inability to make regular surveys to monitor changes in cover. Current estimates are probably out of date. Arable farmland amounts to 13.0 per cent.

Until recently, land use determinations were largely mapping exercises. Allocations for agriculture, protected areas, logging concessions or military uses were made by drawing lines

on maps. As Cambodia moved from a central to a market economy, a struggle for land ensued that involved government ministries and companies. DFW is working to rationalise the system by developing databases of reliable information on watershed class, soil types, forest cover, biodiversity and demographic factors upon which future land uses can be determined.

1.2 Biodiversity

Cambodia falls within three of Udvardy's (1975) global biounits, and four sub-units of MacKinnon (1997).

Indochina (10)	sub-unit Central Indochina (10a) Most of the country
Coastal Indochina (05)	sub-unit Mekong Delta (05a) The south-east bordering Viet Nam sub-unit Cardamom Mountains (5d) The south-west coast and western border with Thailand
Annamese Mountains (-M)	sub unit Central Annam Mountains (-Ma) A small border area adjacent to Lao and Viet Nam in the extreme north-east

Cambodia is moderately rich in biological diversity and levels of endemism. The Biodiversity Index is 7.5 (MacKinnon, 1997) although a higher score may be attainable when inventories are more advanced.

There is no endemic bird area (EBA) but Tonlé Sap is one of three important bird migration sites in GMS. Wetlands are the most critical habitats in Cambodia, and Tonlé Sap in particular is a highly important nesting and feeding ground for large water birds such as eastern sarus crane, great adjutant and Asiatic black stork. Tonlé Sap and the Mekong are also important for the stocks of fish that they harbour, including many endemics and several threatened species.

At lower elevations the flora is typical of the Indo-China Region. Higher up it matches that of the Indo-Malay Region. The families Dipterocarpaceae, Leguminosae, Lythraceae, Fagaceae, Pinaceae and Podocarpaceae dominate the rainforests. Annual loss rate of forest cover is about 0.5 to 1.0 per cent.

Two major forest types and eight sub-types have been identified (Anon. 1996). Areas covered by each are based on 1993 estimates.

Dry land forests

- ε **Evergreen forests** (47,633 km²): Multi-storey forest consisting of more than 80 per cent trees of evergreen species. Main species are *Dipterocarpus dyeri*, *D corbatus*, *D alalatus*, *Anisoptera cochinchinensis*, *Hopea adorata*, *H pierrei*, *Roherea vulgaris*, *Syzygium* spp. The evergreen forests of the southwest harbour what is probably the most valuable biodiversity resource in Cambodia (MacKinnon, 1997).

- ε **Coniferous forests** (98 km²): pine forest, chiefly in kirrom area.
- ε **Deciduous forests** (43,012 km²): Dry deciduous dipterocarp forest. Fire resistant species with thick bark such as *Dipterocarpus intricatus*, *D obtusifolius*, *Shorea obtusa*, *Terminalia tormentosa*.
- ε **Mixed forests** (9,773 km²): Deciduous and evergreen trees, where deciduous species represent more than 50 per cent of the stand.
- ε **Secondary forests** (5,170 km²): Open forest with regrowth, mostly following shifting cultivation.

Edaphic forests:

- ε **Flooded forests** (3,707 km²): Flooded forest around Tonle Sap Lake.
- ε **Flooded secondary forests** (2,598 km²): Flooded secondary forest with open canopy and regrowth after cultivation or cutting.
- ε **Mangrove forests** (851 km²): On tidal saline water and rear mangrove forest.

Known species of plant number 15,000 (at least one third of which are endemic) including at least 2,300 vascular plants.

Wildly differing estimates of vertebrates occur in the literature. Data presented by MacKinnon (1997) are:

ε Mammals	123
ε Birds	545
ε Reptiles	88
ε Amphibians	28
ε Fishes (freshwater)	215

Threatened species recorded in Cambodia, based upon November 1998 data from the WCMC, comprised 229 plants (217 excluding synonyms) and 110 animals. Numbers of threatened animals are listed below. Categories of threat follow those of IUCN.

Mammals (47)	Extinct	-
	Extinct in the wild	-
	Critically endangered	3
	Endangered	7
	Vulnerable	14
	Least risk	16
	Data deficient	7

Birds (42)	Extinct	-
	Extinct in the wild	-
	Critically endangered	2
	Endangered	5
	Vulnerable	12
	Least risk	23
	Data deficient	-
Reptiles (13)	Extinct	-
	Extinct in the wild	-
	Critically endangered	2
	Endangered	2
	Vulnerable	5
	Least risk	4
	Data deficient	-
Fishes (8)	Extinct	-
	Extinct in the wild	-
	Critically endangered	1
	Endangered	4
	Vulnerable	-
	Least risk	-
	Data deficient	2

The most highly threatened species (critically endangered and endangered), based upon information provided from the WCMC database, are listed below.

Critically endangered

<i>Dicerorhinus sumatrensis</i>	Sumatran rhinoceros
<i>Rhinoceros sondaicus</i>	Javan rhinoceros
<i>Bos sauveli</i>	Kouprey
<i>Platalea minor</i>	Black-faced spoonbill
<i>Pseudibis gigantea</i>	Giant ibis
<i>Crocodylus siamensis</i>	Siamese crocodile
<i>Eretmochelys imbricata</i>	Hawksbill turtle
<i>Chela caeruleostigmata</i>	(fish—family Cyprinidae)

Endangered

<i>Pygathrix nemaeus</i>	Douc langur
<i>Hylobates concolor</i>	Black gibbon
<i>Panthera tigris</i>	Tiger
<i>Elephas maximus</i>	Asian elephant
<i>Bos javanicus</i>	Banteng
<i>Pseudonovibos spiralis</i>	Khting vor
<i>Hylopetes alboniger</i>	Particoloured flying squirrel
<i>Leptoptilus dubius</i>	Greater adjutant
<i>Pseudibis davisoni</i>	White-shouldered ibis
<i>Cairina scutulata</i>	White-winged duck
<i>Eupodotis bengalensis</i>	Bengal bustard (or florican)
<i>Tringa guttifer</i>	Nordmann's greenshank
<i>Chelonia mydas</i>	Green turtle
<i>Batagur baska</i>	Batagur
<i>Scleropages formosus</i>	Asian arowana
<i>Tenualosa thibaudeaui</i>	(fish—family Clupeidae)
<i>Probarbus jullieni</i>	Jullien's golden carp
<i>Pangasianodon gigas</i>	Giant catfish

2. BIODIVERSITY POLICY

The National Environment Action Plan (NEAP) for 1998-2002 provides general policy guidelines for biodiversity and protected areas. After descriptions of Cambodia's biodiversity and the status of forests, wetlands and coastal areas it addresses four major themes:

- ε the serious threats to biodiversity in Cambodia caused by uncontrolled trade in wildlife, most of which is one-way traffic across international borders to Thailand by way of Lao, and China by way of Viet Nam;
- ε gaps in the extant protected area;
- ε legal and institutional arrangements for managing protected areas; and
- ε strategies for biodiversity conservation.

Eight broad strategies are prescribed.

Improving legislation

The Royal Decree establishing a protected area system is recognised as being no more than a

first step. Sub-decrees (Prakas) are needed to clarify the Ministry of Environment's (MoE) mandate; to cover operational aspects of management. Biodiversity conservation is to be further advanced by the proposed Law on Environmental Protection and Natural Resource Management.

Developing human resources

Training in relevant subjects is necessary to build management capacity. Staff of the Department of Nature Protection & Conservation (DNPC) in MoE, the DFW in the Ministry of Agriculture, Forestry & Fisheries (MAFF) and the Customs Service.

Mobilising financial resources

The fact that existing financial resources are inadequate is acknowledged. Two sources are suggested: a trust fund and user charges drawn from tourism receipts and revenue from the forest sector.

Management planning

Biodiversity data are scarce. Studies and surveys upon which to base biodiversity management should be started immediately, but critical conservation measures must not be delayed. All protected areas should eventually have management plans.

Priority protected areas

At the time NEAP was produced only one protected area (Preah Sihanouk National Park) was under management. Other priority areas were identified for future management: Verachay, Bokor and Kirirom National Parks; Angkor Protected Landscape; Tonle Sap Multiple Use Area; and three proposed Ramsar sites, Mekong Leour, Boeung Chhma and Koah Kapik.

Participatory management

MoE is to adopt a participatory planning and implementation strategy with all stakeholders, government and non-government. Ways will be sought to increase capacity to participate on the part of local communities, and to find ways in which they can benefit directly from protected areas either through revenue sharing or employment.

International cooperation

Opportunities to designate transfrontier protected areas with Lao and Viet Nam should be grasped.

Boundary demarcation

All protected area boundaries are to be demarcated on the ground.

In addition to NEAP, a National Biodiversity Action Plan is being developed.

3. BIODIVERSITY LEGISLATION

3.1 State law

According to MoE spokesmen the law relating to biodiversity or protected area management is unclear, inadequate and unenforceable. Criminal law, based upon the United National Transitional Authority for Cambodia (UNTAC), which lapsed in 1993, is said to be relevant only for crimes of a most serious nature; e.g., murder, rape or robbery.

Offences such as gathering non-timber forest products (NTFP) or hunting in protected areas appear, at the most, trivial. Not only are the laws inadequate to guard against illegal offtake but rural folk would probably be genuinely puzzled to be told that such everyday and necessary activities were crimes, and courts would likely agree.

The Law on the Environment was passed in 1996. However, it requires sub-decrees to bring it into effect. Three are currently under development or consideration: Water Pollution Control; Protected Area Maintenance; Solid Waste Management; and Environmental Impact Assessments.

Unrelated to the Law on the Environment, provisions for protected areas were declared by Royal Decree '*Creation and designation of protected areas*', 1 November 1993. Levels of protection are defined by Ministerial decree (Prakas Ref. 1033). However, these only state the principles for protected areas: a further Sub-Decree is required to establish their provisions in law, and this has yet to be drawn up. Furthermore, the laws cannot be enforced until protected area boundaries are demarcated on the ground. This would be a considerable undertaking. The combined perimeters of the four national parks presently under some form of management (Bokor, Kirirom, Verachay and Ream) is at least 600 km, much of it traversing rugged inaccessible terrain. Completion of boundary demarcation for even those four areas may be several years in the future.

Under current Forest Law all mammals, birds and reptiles are said to be protected. The first part of Article 66 states simply:

'Catching, poisoning, hunting wildlife and destroying its habitat, such as quadrupeds, birds and reptiles shall be forbidden all over the country except when they are allowed by a competent entity.'

'The competent entity above shall be appointed by a sub-decree upon the proposal of the Ministry of Agriculture, Forestry and Fisheries.'

'An individual who transports and stocks the wildlife or hunting products without a permit or in quantities beyond what is allowed in the permit issued by a competent entity shall be obliged to pay a fine and punished as an individual who has directly committed an illegal act.'

However, MoE representatives assert that the provisions of the law are unenforceable. Even for apparently serious transgressions such as trading in skins or other by-products of conservation flagship species such as tiger, a case would be unlikely to reach court.

'Buffer zones' are often spoken of in MoE and MAFF but they have no legal existence. Nor is it

evident that ministerial staff have a coherent understanding of what is meant by the term. MoE is anxious that the Sub-Decree mentioned above will include provisions for buffer zones although it is unclear how they will be managed.

3.2 International conventions

Cambodia is signatory to the following conventions.

- ε Convention on Biological Diversity
- ε Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

Some sources were sceptical that CITES is being implemented although MAFF has been designated the focal point.

The Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) has not been implemented (February 1998) although Wetlands International reported that the paper work is complete. When Cambodia does sign, the wetland likely to be selected is Koah Kapik, a coastal area with mangrove and other forest types.

4. CATEGORIES OF PROTECTED AREAS

The first protected area in Cambodia was Angkor Archaeological Park, declared in 1925, one of the first in south-east Asia. By the 1960s there are said to have been 22,000 km² of forest reserved for wildlife conservation, but from 1970 to 1990 management was impossible due to civil war. Today's protected area initiatives got underway in the early 1990s.

There are four extant categories of protected area: national park, wildlife sanctuary, protected landscape and multiple use area.

- ε The declared purposes of national parks are to protect, 'natural and scenic areas of significance for their scientific, educational and recreational values.'
- ε Wildlife sanctuaries are 'natural areas where nationally significant species of flora and fauna, natural communities, or physical features require specific intervention for their perpetuation'.
- ε Protected landscapes contain, 'natural and semi-natural landscapes which must be maintained to provide opportunities for recreation and tourism.'
- ε Multiple use management areas are declared with the aim of providing sustainable sources of water, timber, wildlife, fishes, pastures and recreation, with nature conservation aimed primarily at supporting these economic values. It is rumoured that they may become biosphere reserves under UNESCO's Man and the Biosphere Programme.
- ε Plans for a separate system of seven 'protected watersheds' are at an advanced stage. The necessary Royal Decree has been drafted in the Ministry of Agriculture, Forestry and

Fisheries; approved by other affected ministries; and passed to the Prime Minister's office together with a descriptive list of the proposed areas and maps of each. A list of the proposed areas appears below.

Protected watersheds will serve to conserve land in watershed classes 1 and 2, which have steeper slopes and are generally at higher elevations. They will not overlap with existing protected areas. When the Decree becomes law, DFW will attempt to exert better control over logging and the methods used in the declared area, especially along streams. Given existing lawlessness the department will be hard pressed.

5. INSTITUTIONAL ARRANGEMENTS

5.1 State management

The Ministry of Environment (MoE) is charged with safeguarding the integrity of Cambodia's environmental. On paper it is responsible for direct control of land use over 18 per cent of the country (the protected area system). However, its resources are limited, and outside protected areas several other government departments and organisations have a hand in controlling land use over large tracts of territory: DFW; Department of Agriculture; Department of Fisheries; Department of Hydrology; the Royal Cambodian Armed Forces (RCAF); the Police; plus concessionaires, legal and otherwise. All exert significant impacts upon biodiversity, yet none is mandated to safeguard it. Their influences often extend into protected areas albeit illegally. There appear to be no mechanisms for coordinating environmental protection between competing agencies, at least not at functional levels. Each agency operates under a line control system with authority coming down through the hierarchy: there is little or no lateral linkage. Corporate or collaborative management is almost entirely absent. An exception is the close, regular coordination between the community forest units of DFW and the Department of Nature Conservation (DNC).

MoE is empowered with responsibility for planning and developing protected areas. It has six departments:

- ε Department of Environmental Education
- ε Department of Nature Conservation
- ε Department of Geographical Information Systems
- ε Department of Planning & Legal Affairs
- ε Department of Pollution Control

Subservient to MoE are Provincial Departments of Environment, including one for Phnom Penh.

DNC has four sections:

- ε National Parks and Wildlife Sanctuary (NPWS) Unit

- ε Community and Buffer Zone Unit
- ε Forest Wetlands Unit
- ε Coastal Zones Unit

The first named unit is responsible for national parks and wildlife sanctuaries and, in association with the other units and provincial departments, for protected landscapes and multiple use areas. Where protected landscapes include cultural or historical sites, the services of the Ministry of Culture and Fine Arts may be co-opted.

The NPWS Unit has a staff of about 20, half of which are graduates. Their function is to provide guidance, advisory, planning and research services to the protected areas. The national park Rangers are mostly employed by provincial Departments of Environment, with a few NPWS staff and some seconded from RCAF units.

Only four national parks are operational, in that they have permanent staff. No wildlife sanctuary, protected landscape or multiple use area is operational. The numbers of Rangers at each operational national park vary from 15 to 29. Figures cited by the NPWS Unit during October 1998 were Verachay, 20; Kirirom, 29; Bokor, 15; and Ream, 15. In principle the staff of each park form four units:

- ε Administration
- ε Patrol & Law-enforcement
- ε Community Education
- ε Research

Management plans have been developed for two national parks. The plan for Ream was prepared under an IUCN programme. That for Bokor has been drafted under SPEC but has not yet been approved and adopted. The Consultant was shown a copy. While it provides a valuable source of reference material it is hardly a document that could be handed to a Ranger-in-charge to implement. In the Consultant's opinion it is not a practical management manual.

The Ministry of Agriculture, Forestry and Fisheries, through its DFW, has a major role in biodiversity conservation. Its duties devolve around managing plantations and forested land outside the protected area system, and it has a Community Forestry Unit that promotes community participation in these areas. It is also responsible for conserving and protecting wild animals outside the protected area system.

The staff of DFW numbers almost 800. Numbers employed by provincial departments are about the same. They are deployed in plantations, concession areas, road check points and field forest offices. Some are assigned to NGOs working on community development or making inventories of biodiversity.

The community forest units in DNC and DFW cooperate in training programmes and in studies of the ways in which local people use forest resources.

Cambodia's protected areas are not revenue earning enterprises. There is no legal obligation for visitors to pay entrance fees although entry guards manage to relieve them of modest amounts. These payments percolate through the system informally but probably not beyond provincial level. They help top up meagre staff salaries.

5.2 NGO and donor involvement

Considerable support for biodiversity and protected area management comes from donors; probably in excess of 90 per cent of all expenditure. Several organisations participate in management or management orientated studies. They include ADB, UNESCO, UNDP (ETAP), EU through the Support Programme to the Environmental Sector in Cambodia (SPEC), DANIDA, GTZ, WWF, IUCN, OxFam and Wetlands International. The latter (with GTZ help) is assisting MoE develop management programmes for wetlands, and to develop a Wetlands Action Plan.

The Cambodia Environment Management Programme (CEMP) ran from 1996 to 1997 with support from USAID, World Resource Institute (WRI), PACT, IDLP and CARE. It had five components:

- ε Information gathering
- ε Biodiversity
- ε Strategic planning
- ε Applied environmental management
- ε Constituency building

Soon after USAID withdrew at the end of 1997, the biodiversity component continued with support from WWF, and has contributed towards the management of Verachay and Kirirom National Parks. CEMP's support has taken the form of:

- ε equipping the parks with radios, motorcycles, fuels and lubricants to enhance management capacity;
- ε paying some staff salaries;
- ε gathering information on wild animals and habitat;
- ε checking on illegal activities;
- ε establishing monitoring programmes;
- ε organising staff training sessions; and
- ε organising workshops in management and PRA techniques.

Flora and Fauna International (FFI) has conducted mammal and bird surveys in Ratanakiri Province, especially of the giant ibis.

5.3 Private sector involvement

Participation by the private sector is limited to managing small accommodation units in Kirirom National Park. In Bokor National Park, limited tourism facilities are run directly by park staff.

General ecotourism management guidelines, upon which plans to involve the private sector might be developed, do not yet exist although the subject is examined and recommendations made in the draft management plan for Bokor National Park. More is said on ecotourism under section 9.

6. INVENTORY OF PROTECTED AREAS

National parks (IUCN management category II)

	<u>Size (km²)</u>
1. Botum Sakor	1,713
2. Kep	50
3. Kirirom	350
4. Bokor (Phnom Bokor)	1,400
5. Phnom Kulen	375
6. Ream	1,500
7. Verachay	3,325
<u>Total national parks</u>	<u>8,713</u>

Wildlife sanctuaries (IUCN management category I)

	<u>Size (km²)</u>
1. Boeung Per	2,425
2. Kulen Promtep	4,025
3. Lomphat	2,500
4. Peam Krasop	238
5. Phnom Aural	2,538
6. Phnom Nam Lyr	475
7. Phnom Prich	2,223
8. Phnom Sankos	3,338
9. Roneam Daun Sam	1,788
10 Snoul	750
<u>Total wildlife sanctuaries</u>	<u>20,300</u>

Protected landscapes (IUCN management category III or V)

	<u>Size (km²)</u>
1. Angkor	108 III
2. Banteay Chhmar	812 V
3. Preah Vihear	50 V
<u>Total protected landscapes</u>	<u>970</u>

Multiple use areas (IUCN management category VI)

	<u>Size (km²)</u>
1. Dong Peng	277
2. Samlaut	600
3. Tonle Sap	3,163
<u>Total multiple use areas</u>	<u>4,040</u>

Proposed protected watersheds (IUCN management category PRO)

Seven proposed protected watersheds are listed in the draft Royal Decree mentioned above under section 3.1. If approved and declared their equivalent management category would probably be VI.

	<u>Size (km²)</u>
Stung Treng	4,644
Prek Thnot	1,832
Prek Kompong	1,847
Stung Posat	2,423
Sre Pork	3,311
Stung Chimit	3,714
Stung Sangke	2,607
<u>Total proposed protected watersheds</u>	<u>20,387</u>

DFW reports that the proposed watersheds do not overlap with existing protected areas, which was confirmed by inspection of the maps that accompany the draft Royal Decree.

7. CONSERVATION COVER BY PROTECTED AREAS

1. Cambodia's earliest protected wildlife areas developed before World War II (there is said to have been 173 of them) were based upon the distribution and abundance of game animals and hunting opportunities. The present day system drew upon this, and used old survey and forest maps (from the 1930s) to identify gaps and fill them. There was, therefore, a conscious attempt to conserve biodiversity. Maps of each area in 1:500,000 scale are attached to the Royal Decree, and are also stored on disc in MoE.
2. The extant protected area system covers 18.8 per cent of the country. Proposed protected watersheds are omitted from this figure. Protected areas within IUCN categories I-IV (national parks and wildlife sanctuaries) make up 85 per cent of the total system or 16.0 per cent of the country.
3. National parks — 8,713 km² — 4.8 per cent
4. Wildlife sanctuaries — 20,300 km² — 11.2 per cent
5. Protected landscapes— 970 km² — 0.5 per cent
6. Multiple use areas — 4,040 km² — 2.2 per cent
7. Total — 34,023 km² — 18.8 per cent
8. Three of the four biogeographical subunits are represented in the protected area system. The exception is subunit 05a Mekong Delta. MacKinnon (1997) noted that most of the natural habitat here has been destroyed or modified although some areas of swamp remain that are used as wintering feeding grounds by a range of waterfowl, and which would benefit from protected status.
9. A gap in forest cover is the paucity of lowland dry evergreen forest. This forest type, where it occurs inland has been extensively destroyed in South East Asia. A large example lies to the west of the Mekong River, along the borders of five provinces, roughly between latitudes 12⁰20' and 13⁰30' N. Once a tract of pristine forest said to have been 100 x 30 km in extent, it is now severely degraded and allocated to concessionaires. The proposed Stung Chinit protected watershed (3,714 km²) includes most of this area.
10. Although Cambodia's protected area system has been designed with an eye to achieving good biodiversity and heritage cover *in principle*, it cannot be claimed that this is so in practice. Most protected areas exist only on maps, and it is unrealistic to maintain the fiction that MoE controls, or ever can control, land use over 18 per cent of the country. The system may win applause on the international conservation circuit but there is little justification for believing that such vast tracts of land can be brought under *de facto* management in the face of problems described below under section 13, ever increasing human populations and heightened demands for land.

8. AREAS OF MAJOR BIODIVERSITY SIGNIFICANCE

Eight areas have been identified but most suffer from on-going deforestation and illegal hunting. Respondents within Cambodia expressed doubts as to whether any of the last four areas listed below can ever be rehabilitated.

Meklong Leour. Not a protected area. It lies along the Mekong River in northern Cambodia in Kratie and Stung Treng Provinces, and has been proposed as a Ramsar site. It comprises sandy and rocky islands with unique tree communities and shrubs such as species of *Barringtonia*, *Engenia*, *Acacia* and *Morindopsis*. The Irrawaddy dolphin occurs plus (among bird life), river tern, small pratincole, oriental darter and great stone plover.

Bokor National Park. A highly scenic area, reaching 700 metres above sea level yet close to the coast. It has high watershed conservation value for the river that serves Kam Pot town – the provincial centre. Several large mammals survive including elephant, Malayan sun bear and tiger. There is rich birdlife including several threatened species. There is good tourism potential.

Verachay National Park. The largest national park (although two wildlife sanctuaries are larger) containing some of the best-forested areas (upland evergreen) in the GMS. There is geological interest in the form of very ancient rock formations that extend into Viet Nam, and extinct volcanoes. It contains the only high elevation forest in Cambodia. There is high watershed conservation value, protecting parts of the Se Cong and Se San River catchments. Several large mammals survive including Asian elephant and gaur, and possibly douc langur. There is excellent potential for ecotourism.

Tonlé Sap Multiple Use Area. This is a wetland of supreme biodiversity importance but it is questionable whether the entire area can effectively be managed as a protected area because of its size and vast array of environmental concerns (Parr *et al*, 1996). Some areas may be upgraded to the equivalent of one of IUCN's categories I-IV. Part may be proposed for Ramsar site status.

Kulen Promtep Wildlife Sanctuary. The largest protected area in Cambodia, originally designed to protect kouprey. Fine areas of northern forest mosaics occurred (open dipterocarp, lowland evergreen or semi-evergreen and the largest swamp in northern Cambodia) but there are reports of military presence and severe deforestation.

Lomphat Wildlife Sanctuary. Good coverage of evergreen forest on basaltic soils, grassy glades, open deciduous forest, mixed deciduous forest, pockets of evergreen and semi-evergreen forest, riverine habitats and small wetlands. Originally proposed to conserve kouprey, but the wildlife has been drastically reduced to small numbers of samba deer, muntjac and wild boar. Local people report that central areas have been less affected, and that gaur and banteng persist within them. Elephant may also survive in more densely forested areas, and the area provides breeding ground for sarus crane.

Phnom Samkos Wildlife Sanctuary. The Cardamom Mountains and their forest cover that support (or supported) a broad range of large mammals including tiger, banteng, gaur and Eld's deer. Current reports say that the area has been severely affected by illegal logging that produces timber to export to Thailand.

Phnom Prich Wildlife Sanctuary. Habitats similar to Lomphat. Banteng and Asian wild dog occur. Elephants use the area seasonally. Breeding ground for sarus crane. Wildlife is reported

to have suffered from heavy illegal hunting pressures.

9. TOURISM IN PROTECTED AREAS

Before 1970, Cambodia was considered a tourists' paradise: up to 100,000 visitors flocked to the country each year. Early brochures depict beautifully tended urban parks of tropical plants, and magnificent architecture – ancient and modern. What would nowadays be termed ecotourism was at most a minor component.

Although the Pol Pot regime brought a sudden end to tourism, which lasted several years, tourism volume today is above 1960's levels. During the first nine months of 1998, 95,278 visitors entered Cambodia on holiday: business and official visitors are not included in this figure. About one third were on group-tour, multi-country visits.

Current MoT policy is to diversify tourism by promoting opportunities for ecotourism as well as the country's rich cultural and archaeological heritage. Promotional strategy is focussing on four areas.

- ε Phnom Penh: museum, monuments and architecture.
- ε Coastal areas of Kom Pot Province. Sea, sand and sun holidays with some ecotourism (Bokor National Park is in this region).
- ε Ratanakiri Province in the north-east. Ecotourism (Verachay National Park).
- ε Angkor Protected Landscape. Cultural heritage.

Other tourism features may include boat trips along the Tonlé Sap River and Lake to reach Angkor Protected Landscape, and a combined river and road journey from Phnom Penh to Ratanakiri.

MoT anticipates that the ecosystem market will be filled largely by visitors from abroad.

At present there is little infrastructure to support ecotourism in the protected areas, and security in remote areas is far from assured. Kirirom National Park attracts local visitors during the dry season; much fewer at Ream and Bokor National Parks. Foreign tourists are rarely seen, other than expatriates resident in Cambodia. The domestic ecotourism market has potential but is constrained by apprehensions about the dangerous nature of wild lands and the animals that inhabit them. For the foreign market, fears of dangers arising from civil war and banditry must be overcome.

The potential for an ecotourism industry exists but is unlikely to be realised unless security is reinstated; adequate policies and legislation are introduced, backed up by effective enforcement; simple, coherent management plans are prepared and implemented; facilities established to cater for visitors; and an aggressive marketing campaign mounted.

Another serious impediment to establishing ecotourism is misunderstanding arising from past experiences of Cambodia's national parks. The values of protected areas in conserving

biodiversity, safeguarding watersheds, providing facilities for public recreation, education and research and contributing to local and national economies are not apparent to politicians and other decision-makers. They perceive protected areas as playgrounds for the wealthy, based largely upon the manner in which Kirirom National Park was reportedly developed in previous years, with expensive holiday homes, casino and golf course.

10. COMMUNITY PARTICIPATION

Every protected area has people living in it although not necessarily in core areas. These communities are not, at present, a serious constraint to protected area management except in southeastern areas where population densities are higher. The greatest adverse pressure comes from the RCAF, logging companies and traders.

In MoE, the Community Forestry and Buffer Zone Management Unit (CFBZMU), assisted by WWF, works with DFW's and DNC's Community Forest Units to promote participation in managing forest resources as an aid to protected area management. It focuses on two issues.

- ε Training programmes directed at staff of provincial environment and forestry departments, NGOs and members of local communities.
- ε Co-ordinating bimonthly 'forestry network' meetings in Phnom Penh attended by national and provincial participants and academic staff from the Royal University of Agriculture. The purpose is to promote discussion, pass on ideas and experiences and provide a forum for self-help.

The DFW Community Forest Unit concentrates upon developing community participation in plantations and in forest land outside protected areas known as 'state forests'. It maintains close liaison with its counterpart unit in DNC and CFBZMU, and cooperates with them in providing training programmes at provincial level.

DFW's chief concern is to protect forests, and a strategy is to improve living conditions for local people who depend upon forest resources and, at the same time, enlist their help. The Department stresses however that local communities are not sole stakeholders in the allocation of forest resources. Logging companies that hold concession rights are equally important, and DFW maintains that a balance must be maintained between the two interest groups.

CFBZMU is undertaking studies in natural resource uses around protected areas, together with feasibility studies into ways in which local people and the protected areas can benefit. Three national parks are used in this pilot project: Verachay, Kirirom and Ream. IUCN may join in using Bokor National Park as its study area.

11. GENDER

Men occupy the majority of posts in DNC although exact figures were unavailable. Women are also outnumbered in the provincial departments although three female Rangers in Verachay National Park perform administrative, communications and extension duties.

Traditionally family heads are men, and men are the chief hunters and cutters of timber. Gathering NTFP is largely woman's work. Men dominate community discussions and decision making. Women tend to be shy and reluctant to participate.

12. CROSS BOUNDARY ISSUES

12.1. Internal boundaries

Some protected areas lie across provincial boundaries. For example, Verachay National Park extends across two provinces and three districts. DNC reports that this does not result in any serious friction although it admits that administration would be simplified if there were single administrative headquarters for each national park.

12.2. International borders

Seven protected areas are close to international borders. Those marked with asterisks are contiguous with protected areas in adjacent countries.

Adjoining Thailand

Phnom Sankos Wildlife Sanctuary
 Samlaut Multiple Use Area
 Roneam Daun Sam Wildlife Sanctuary
 Banteay Chhmar Protected Landscape *

Adjoining Lao and Viet Nam

Verachay National Park *

Adjoining Viet Nam

Phnom Nam Lyr Wildlife Sanctuary *
 Snoul Wildlife Sanctuary

12.3 Cross border trade

In addition to timber exports that ensure the maintenance of unsustainable harvesting within Cambodia, massive consignments of illegally taken wild animals and their by-products, including species covered by CITES, flow eastwards across the border into Viet Nam. An IUCN report (Anon. 1998b) recorded trade routes from Cambodia (and Lao) into Viet Nam, from within Viet Nam itself, and then via Hanoi to China, which has an apparently insatiable appetite for wild animals. The end uses are chiefly medicinal and culinary although some products are used for handicraft work (e.g., tiger claw pendants) or as trophies (e.g., elephant tusks or tiger skins). Some primates and most birds are traded live as pets.

There are several border points between Cambodia and Viet Nam, across which wildlife is exported. A major route passes through Neak Lung on the Mekong River 60 km south of Phnom Penh, and then on to Ho Chi Minh City, from where it swings north to Hanoi and

beyond. Reptiles, in particular, are transported along this route.

Reptiles and small mammals make up the bulk of the trade. Birds are exported in lesser numbers. Larger mammals include macaques, gibbons and langurs, which are less commonly traded but fetch higher prices. The rarest species such as tiger, leopard and elephant are traded in the form of by-products.

Another market in wildlife by-products involves the wild cattle—gaur, kouprey and banteng, which occur on the border between Cambodia and Lao. They are hunted for trophies that are exported to Thailand. Thai middlemen encourage this trade.

In a Phnom Penh market, the Consultant found the carcasses or parts of many lesser creatures on sale although a MoE spokesman reported that DFW and the Police had recently ‘cracked down’ on wildlife trade. In particular there were boxes of dried toads, snakes, bird legs and squirrels. Larger products included a whole tiger skin on open display, several civet pelts and python skins. Numerous live birds were on offer, principally swallows, bee-eaters and small finches, although they were for immediate release by their purchasers for religious purposes.

13 MAJOR PROBLEMS AND ISSUES

13.1 Apathy and unawareness

There is no clear public or official desire for biodiversity conservation or protected area management, in spite of government statements to the contrary. There is no apparent public recognition that biodiversity or protected areas contribute towards filling any meaningful human needs. Rural people are not familiar with the concept of protected areas. Absence of demarcation on the ground exacerbates the problem. There is little or no public support; nor is there adequate public information about protected areas and the laws that apply to them, which might help to dispel current apathy and ignorance.

13.2 Lack of security

Continuation of civil war activity is a bar to any form of land use management in affected areas. Land mines endanger human and wild animals especially in northern areas.

13.3 Logging

Logging is the chief intrusive activity on forested land. A DFW spokesman reported that only 10 per cent of all commercial logging in Cambodia is authorised by concession. Given that concessions are awarded over the head of DFW, and in apparent defiance of law, the terms ‘legal’ and ‘illegal’ have little or no meaning.

Logging is most serious in northeastern areas, where forest cover is richer and less accessible to local inhabitants. In the more densely populated areas of the southeast, fuelwood needs place unsustainable demands upon the resource. Rates of change in forest cover have varied between forest types. Between 1973 and 1993, annual losses or increases were as follows.

Evergreen forest	- 1.5 per cent
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Coniferous forest	+ 0.3 per cent
Deciduous forest	- 0.5 per cent
Mixed forest	?
Secondary forest	?
Flooded forest	- 3.0 per cent
Flooded secondary forest	?
Mangrove forest	- 0.5 per cent

Anon. (1996b) noted a mean loss rate for dry forests of 0.5 per cent, about half that recorded in other countries of the sub-region over the same period, but MacKinnon's (1997) estimate was 1.0 per cent.

Logging occurs in all protected areas, sometimes on an intensive scale. Fifteen protected areas have commercially valuable timber species, making them especially vulnerable. RCAF units entrusted with protecting forest resources ignore or encourage logging. Land adjacent to protected areas is often allocated for authorised timber extraction, providing opportunities for logging companies to disguise unauthorised harvesting in protected areas.

There is a one-way movement of timber from Cambodia to Thailand, Lao and Viet Nam. Numerous uncontrolled tracks, capable of carrying heavy vehicles cross, the borders with the three neighbouring countries in spite of a joint agreement signed by all four countries, which is simply not enforced.

Local authorities make economic gain from these illegal activities; there is no incentive for them to attempt law enforcement.

13.4 Legal ambiguity

Forest and protected area laws and the ways in which they are applied (or ignored) have serious consequences for biodiversity. Under concessions for commercial extraction of timber, 7 million ha (70,000 km²) of land have been allocated in addition to tracts of unknown size allocated for large-scale agricultural programmes and military use. Areas allotted for commercial extraction amount to almost two-thirds of all remaining forest, with the potential for alarming effects upon biodiversity. A report on forest policy (Anon. 1996b) noted that concessions are not awarded in a transparent manner. A review of the legalities of forest concessions made under World Bank funding reported considerable confusion and ambiguity in the application of Forest Law. This review has not been made public.

Statutory laws for protected areas, by Decree or through the Law on the Environment, are said to be unenforceable because the sub-decrees required to set specific regulations in place have not yet been promulgated. This seems questionable to the extent that MoE has at least *some* legal claim to protected areas declared by Royal Decree, compared with trespassers who have *no* legal rights of any sort. It appears, however, that MoE makes little or no attempt to test the claims of those who exploit resources in protected areas. That it fails to do so suggests a lack of political will and a confused belief that once sub-decrees are promulgated all will be well. In mitigation it is argued that if attempts were made to test a claim, courts could not be relied upon to give impartial judgements.

13.5 Corruption

Massive corruption characterises the timber industry and effectively neutralises what little law does exist. *'The co-Prime Ministers authorise virtually every concession, illegal timber export and permits to confiscate old felled logs'* (Anon. 1998c). The same source also implicates the Prime Ministers of Thailand and Viet Nam and the RCAF and observes that. DFW officials fail to confront the issue of illegal logging, perhaps because of intimidation.

13.6 Abuse of wetlands

Wetland habitat is being lost through conversion of swamp to agriculture. Forest removal around Tonlé Sap has led to increased siltation decreased depth. The life cycles of fishes that move between main river systems and spawning areas in upstream tributaries or swamp forests are being disrupted.

13.7 Inadequate resources

DFW and DNC are understaffed and under-funded. Most protected areas are unmanned. Those that are manned are ill equipped and without transport other than shared bicycles.

Most protected areas are remote, access is difficult and security is poor. Malaria is a constant threat. Most areas lack a permanent ministerial presence so that capacity for enforcing those laws that do exist is low. Lawlessness, intimidation and corruption are rife.

If the ambitious protected area system is to be managed in accordance with the intentions that went into its design, considerable increases in manpower, training programmes and equipment will be needed.

13.8 Inadequate mechanisms for coordination

Co-ordination between agencies responsible for different aspects of land use appears to be absent or inadequate.

13.9 Local pressures

Most (perhaps all) protected areas have human settlements and associated shifting cultivation within. People living in or nearby protected areas harvest NTFP (including wild animals) from within. They also cause fires that thin out the fire tolerant dry dipterocarp forests year by year. Not all people originated locally. Some are outsiders who have come there to find land and access to forest resources. When conflicts arise over land use local politicians side with people who are cultivating or using protected areas in other ways.

Illegal hunting is widespread wherever sufficient animals remain to make this a worthwhile activity. According to an article in the Cambodia Daily of 18 Feb 1999, poachers have taken to using homemade explosives to trap and kill tigers, chiefly to harvest their bones and skins. The economic value of a single tiger's by-products is estimated to be at least \$1,500 to the middlemen who smuggle them across international borders, which is more than four times average annual income.

13.10 Size of the protected area system

The protected areas have been selected with biodiversity conservation and representativeness firmly in mind resulting in an admirably designed system that covers over 18 per cent of total land area (16 per cent of IUCN management categories I to IV). However, it is doubtful whether any other country in the world can match this and it must seriously be questioned whether such an enormous system can be put under effective control in the foreseeable future, while rising rural populations continue to exert increasing demands upon unoccupied land, exacerbated by lawlessness and apparent lack of any significant public concern.

13.11 Dwindling donor support

Donor support accounts for 90 per cent of all protected area funding. Continuance beyond 1998 is in jeopardy. Recent political troubles led to withdrawal of USAID. Others may follow.

13.12 Uncontrolled wildlife trade

The cross border trade described above adds to Cambodia's natural resource impoverishment.