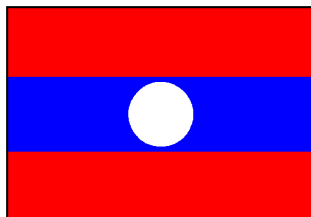


**Regional Environmental Technical Assistance 5771
Poverty Reduction & Environmental Management in Remote Greater Mekong Subregion (GMS) Watersheds
Project (Phase I)**



BIODIVERSITY AND PROTECTED AREAS

Lao PDR

By

J E Clarke, PhD

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1. BACKGROUND

1.1. Country profile

Lao PDR is in the east-central part of the Indochinese peninsula, between latitudes 13⁰50' and 22⁰30' N, and longitudes 100⁰10' to 107⁰40'E. Its area is 236,000 km². Elevations range from 80 metres, where the Mekong River leaves the country in the extreme south, to 2,820 metres at Phu Bia Mountain in Xieng Khuang Province. Seventy per cent of the country is high mountain terrain.

Lao PDR is land locked. At the extreme north are short borders with Myanmar and the Chinese province of Yunnan. To the east is a long border with Viet Nam; to the south, Cambodia; to the west, Thailand. The country contains 17 administrative provinces, including one special region (Xaysomboun).

The climate is dominated by monsoons, with pronounced wet and dry seasons. Most rain falls during May to September, when the prevailing winds blow from the southwest. Annual rainfall ranges from 1,000 mm in the extreme south to 3,000 mm in the north. The dry season, from October to April, is characterised by winds that blow from the north-east.

Mean temperatures range from about 10⁰C in January to 38⁰C in July, cooler in the north, warmer in the south. Lowland areas are tropical, while the highest elevations and the mountains of the extreme north are sub-tropical.

The Mekong River is the dominant drainage system. It reaches Lao PDR from China in the northwest, where it demarcates the international borders with Myanmar and Thailand. It enters Lao, swings eastwards to Luang Prabang; then south to rejoin the border with Thailand, past Vientiane, and re-enters Lao again near Pakxe from where it flows south into Cambodia. Several major tributaries enter the Mekong from the east during its 1,600-km journey between China and Cambodia. There are no natural lakes: the largest body of surface water, Nam Ngum to the north of Vientiane, is man-made.

The human population estimate in 1993 was 4.6 million. Annual population growth is 2.8 per cent, suggesting a 1999 population of about 5.4 million and a population density of 22.9/km². This is the lowest in the GMS, nearly three times less than neighbouring Cambodia (66.3), and less than a tenth of Viet Nam's 241.

Forest and woodland covers 52.3 per cent of the land (second only in the GMS to Cambodia), while arable farming is practised on only 3.3 per cent, the least for the GMS countries.

1.2. Biodiversity

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

Indochina (10)	sub-unit Central Indochina (10a)	Most of the Mekong drainage
	sub-unit North Indochina (10b)	Most of northern Lao PDR
	sub-unit Indochina transition (10c)	A small mountainous area in the extreme north
Coastal Indochina (05)	sub-unit North Annam (05c)	A narrow band along part of the border with Viet Nam
Annamese Mountains (-M)	sub-unit Central Annam Mountains (-Ma)	A small border area in the extreme southeast

Lao PDR has moderate levels of biological richness and a few endemic species. The Biodiversity Index is 8.5

(MacKinnon, 1997).

Part of one Endemic Bird Area, the Annamese Lowlands EBA, occurs in Lao PDR. Most of this EBA lies in Viet Nam (see the section for that country) but a small extrusion extends into Lao in the region of Nakai Nam Theun National Biodiversity Conservation Area.

The Annamese Lowlands EBA is the most acutely threatened EBA in the GMS. Nine restricted range species occur but only four are known (or are likely) to occur in Lao PDR. They are listed below with global status and habitat.

White-cheeked laughingthrush (*Garrilax vassali*) **Least concern**.
Evergreen forest edge, secondary growth, scrub, grassland, edges of cultivation from 600 to 900 metres.

Short-tailed scimitar-babbler (*Jabouilleia danjoui*): **Vulnerable**.
Undergrowth in lowland evergreen forest and bamboo between 50 and 900 metres.

Sooty babbler (*Stachyris herberti*): **Vulnerable**.
Forest on limestone outcrops at about 200 metres.

Grey-faced tit-babbler (*Macronous kelleyi*): **Near threatened**.
Lowland evergreen forest and bamboo from 50 to 700 metres.

Most of Lao PDR was once forested. MacKinnon & MacKinnon (1986) estimated 68 per cent comprised evergreen forest, 23 per cent mixed deciduous and 7 per cent dry dipterocarp. Berkmuller *et al* (1995) observed that, by 1992, coverage of these forest types were 5, 35 and 5 per cent respectively, revealing a dramatic decline in evergreen forest. The main forest types today are:

- **Dry evergreen forest:** Extensive areas in the north
- **Tropical montane evergreen forest:** Along highland areas of the Annamite Mountains and Bolovens Plateau
- **Lowland semi-evergreen dipterocarp forest:** The Mekong Plain
- **Tropical montane deciduous forest:** Scattered areas in the north
- **Dry dipterocarp forest:** Southern areas
- **Mixed deciduous forest:** Southern areas
- **Forest on limestone:** Small areas in the Annamite Mountains
- **Pine forest:** Small areas in the Annamite Mountains
- **Sub-tropical montane forest:** Small area in the extreme north.

The numbers of known species of higher plants (MacKinnon, 1997) is presently 8,286. Known vertebrates number about 1,300 but the following approximations must be subject to considerable revisions as further surveys and studies progress.

- | | |
|--------------|-----|
| • Mammals | 200 |
| • Birds | 750 |
| • Reptiles | 70 |
| • Amphibians | 40 |
| • Fishes | 250 |

Three large mammals recently discovered to science are small dark muntjac (*Muntiacus truongsoneis*), giant muntjac (*Megamuntiacus (Muntiacus) vuquangensis*) and saola (*Pseudoryx nghetinhensis*). They are endemic to the Annamite range along the border between Lao PDR and Viet Nam

Threatened species recorded in Lao PDR, based upon November 1998 data from the WCMC, comprised 220 plants (211 excluding synonyms) and 150 animals. Numbers of threatened animals are listed below. Categories of threat follow those of IUCN.

Mammals (60)	Extinct	-
	Extinct in the wild	-
	Critically endangered	3
	Endangered	8
	Vulnerable	20
	Least risk	20
	Data deficient	9
Birds (72)	Extinct	-
	Extinct in the wild	-
	Critically endangered	2
	Endangered	4
	Vulnerable	21
	Least risk	45
	Data deficient	-
Reptiles (10)	Extinct	-
	Extinct in the wild	-
	Critically endangered	1
	Endangered	1
	Vulnerable	5
	Least risk	2
	Data deficient	1
Fishes (9)	Extinct	-
	Extinct in the wild	-
	Critically endangered	1
	Endangered	4
	Vulnerable	-
	Least risk	-
	Data deficient	4

The most highly threatened species (critically endangered and endangered), based upon information provided from the WCMC database, are listed below. Where appropriate, comments or corrections have been added based upon local information from relevant specialists.

Critically endangered

<i>Dicerorhinus sumatrensis</i>	Sumatran rhinoceros
<i>Rhinoceros sondaicus</i>	Javan rhinoceros
<i>Bos sauveli</i>	Kouprey
<i>Pseudibis gigantea</i>	Giant ibis
<i>Lophura imperialis</i>	Imperial pheasant (not in Lao PDR: Thewlis <i>et al</i> , in press)
<i>Crocodylus siamensis</i>	Siamese crocodile
<i>Botia sidthimunki</i>	(fish—family Cobitidae)

Endangered

<i>Pygathrix nemaeus</i>	Douc langur
<i>Hylobates concolor</i>	Black gibbon
<i>Cynogale lowei</i>	Lowe's otter-civet (not in WCMC database for Lao PDR but may occur)

<i>Panthera tigris</i>	Tiger
<i>Ailurus fulgens</i>	Lesser panda (unconfirmed for Lao PDR)
<i>Elephas maximus</i>	Asian elephant
<i>Bos javanicus</i>	Banteng
<i>Bubalis bubalus</i>	Wild water buffalo (not in WCMC database for Lao PDR but occurs)
<i>Pseudoryx nghetinhensis</i>	Saola
<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>Tringa guttifer</i>	Nordmann's greenshank
<i>Cuora trifasciata</i>	Chinese three-striped box turtle
<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

Other known or possible Lao species not presently in the WCMC database and for which level of threat has to be assessed or reassessed.

<i>Muntiacus truonsonensis</i>	Small dark muntjac
<i>M vuquangensis</i>	Giant muntjac
<i>Sus bucculentus</i>	Viet Nam warty (or Indochinese) pig (Listed by WCMC as an extinct former endemic of Viet Nam)
<i>Pseudonovibos spiralis</i>	Khting vor

2. BIODIVERSITY POLICY

Lao PDR's policy on biological conservation is based largely on a system of protected areas and the application of sound conservation practices in forest management.

The national stance on environmental management in general is stated in the Environment Action Plan (EAP), produced by the Scientific, Technology and Environment Organisation (STENO) in 1993. STENO is the organisation responsible for co-ordinating environmental protection. EAP addresses the necessity for biodiversity conservation although this may be amplified in a National Biodiversity Conservation Plan currently in the planning stage with the assistance of IUCN.

Biodiversity conservation is also addressed in the closely related Tropical Forest Action Plan of 1990, which prescribed six major activities.

- technical support for the Department of Forestry
- watershed protection
- improving utilisation of forest resources
- promoting forest plantations
- developing alternatives to shifting cultivation
- conserving biodiversity

Policies, objectives and purposes of protected areas are defined in the Forest Law of 1996 and Decree 164 of 1993

(see below). Other relevant policy initiatives include:

- Forestry Research Strategy;
- Watershed Management Strategy;
- Decision on Customary Rights and the Use of Forest Resources (0054/MAF);
- Forestry Guidelines for Hydropower Development Projects in Lao PDR;
- Forestry Strategy up to year 2000; and
- Human Resource Development Plan for the Forestry Sector.

3. BIODIVERSITY LEGISLATION

3.1 State law

The Decree on Wildlife, Aquatic Life Conservation and Hunting/Fishing Control (No 118/PMC) was promulgated in 1989. This placed responsibility for enforcing the Decree and developing regulations on the Ministry of Agriculture and Forestry (MAF). It prohibited the use of specified methods of hunting and fishing; prohibited hunting of specified species; laid requirements for movement permits for live and dead wildlife; gave public rights to destroy animals that threatened human life; and required other disturbances by wildlife to be reported to local forest offices. It was a very sketchy piece of legislation – at least in the English language translation, which was all that was available to the consultant.

Decree 164 promulgated in 1993, designated the first national biodiversity conservation areas (NBCAs). The provisions of this Decree remain in force today: the Forest Law that followed three years' later did not supersede them. According to the Decree the objectives of NBCAs are:

- to protect and reserve natural resources sustainably (forests, wildlife and water sources);
- to reserve an abundance of nature and protect against environmental impacts; and
- to conserve natural landscapes for tourism and scientific research.

The rules and regulations that apply to NBCAs ban the following activities.

- Logging or cutting except with permission from central government for research purposes.
- Harvesting non-timber forest products (NTFPs) including hunting and fishing except with permission from the Ministry of Agriculture and Forestry (MAF) and the authority responsible for the NBCA concerned.
- Surveying, mining and construction projects except with permission from central government.
- Occupation of land, settled residence and expansion of cultivation.
- Collecting or moving archaeological artefacts.
- Using explosives, chemicals or poisons or polluting.
- Shifting cultivation.

MAF was charged with making detailed regulations accordingly; and to establish management plans, procure budgets and implement plans.

Basic legislation for protected areas is contained in the Forestry Law of 1996, which prescribes a framework for all aspects of forest management and conservation (Marsh, 1998). Regulations for protected area management are being developed that will translate broad policies into specific management procedures.

Article 1 of the Law states that it aims at:

'achieving and maintaining natural equilibrium, making forest and forest land a sustainable base for people's livelihoods, ensuring the protection and conservation of watersheds, guarding against soil erosion, protecting plant and wildlife species and the environment and contributing to national economic and social development.'

The Law contains no definition of 'wildlife' but the contexts in which the term is used clearly imply that it means vertebrate animals excluding fishes.

DoF is elaborating the Forest Law through subsidiary regulations to be promulgated in a Prime Minister's Decree. This may include designating several categories of protected area, replacing the existing single tier system. Simultaneously, Decree 164 may be replaced with a new legal instrument that includes additions, deletions and boundary changes.

3.2 International conventions

Lao PDR has ratified four international conventions concerned with biodiversity conservation, and which STENO is the supervisory authority.

- Convention on Biological Diversity
- Convention Concerning the Protection of World Cultural and Natural Heritage
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention)
- UN Convention to Combat Desertification

Lao PDR has not yet signed the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) though it may do so when the government has introduced relevant statutory laws some for controlling trade and export and import of wildlife and wildlife by-products, and is confident of being able to police them.

4. CATEGORIES OF PROTECTED AREAS

'Lao is one of the very few Asian countries which does not yet have a protected area system in place and lacks protection legislation or protected areas.'

This statement appeared as recently as 1993 in EAP. Circumstances have changed greatly since then. Protected areas in Lao PDR are undergoing active development, the current programme having begun in 1988 through the Sida-funded Lao-Swedish Forestry Cooperation Programme, supported by technical assistance from IUCN.

Article 16 of the Forest Law provides for five classes of forest.

- Protection Forest
- Conservation Forest
- Production Forest
- Regeneration Forest
- Degraded Forest

The first two are relevant to biodiversity conservation and watershed protection although individual regeneration forests could presumably, in time, be reclassified as protection or conservation forests. In total, the numerous protection forests and conservation forests are reported to cover over 80,000 km²—about 76 per cent of recognised forest estate.

Protection forest (Article 17) is defined as:

'forest and forest land classified for the protection of watershed areas and the prevention of soil erosion. It also includes areas of forest land significant for national security, areas for protection against natural disaster and protection of the environment and other areas.'

Conservation forest (Article 18) is defined as:

'forest and forest land classified for the purpose of protecting and conserving animal species, nature and various other things which have historical, cultural, tourism, environmental, educational and scientific research value.'

Article 42 elaborates on this by specifying conservation forests' role in maintaining biodiversity and natural forest and landscapes, *'for the development of national parks appropriate for tourism and scientific research.'* It also provides for zoning into total protection zones, controlled use zones and corridor zones. The former would be closed to entry or harvesting of NTFP—plant or animal.

Article 12 provides for forest lands that have been classified and delineated to be, *'passed down from province and prefecture to the districts, and then by districts to the villages which assume responsibility.'* This gives rise to the existence of areas known as 'Provincial and District Protected Areas' (which are managed by provincial and district governments). Their status is unclear but they appear generally to be subsets of conservation forest.

Although the objectives of conservation forest appear to be directed at preserving biodiversity together with naturally occurring and man-made phenomena, in practice their management focuses almost entirely upon protecting trees, controlling shifting cultivation and establishing stable human settlements. In spite of the provisions of Articles 12 and 42, there are no overt attempts to manage wildlife or biodiversity in general.

Decree 164 provides for NBCAs, where the primary purpose is to manage for biodiversity conservation. Although as yet unstated formally, in practice the policy objectives for NBCAs are to protect and conserve:

- landscapes;
- representative areas of the major biotic communities;
- selected species of flora and fauna (endemics and threatened species in particular); and
- biodiversity in general.

Long-term management is reported to aim at reducing present-day extractive uses to tolerable levels and phasing them out entirely in core zones, which will be given maximum protection.

These objectives appear similar to those for conservation forests, yet areas so designated are said not to overlap.

5. INSTITUTIONAL ARRANGEMENTS

5.1 State management

The management of protected areas involves three tiers of government: central or national, provincial and district; and below that the villages.

Central government is represented by the MAF, through its Department of Forestry (DoF), within which is the Centre for Protected Areas and Watershed Management (CPAWM). The latter is responsible for general policy matters, coordination and international cooperation. Provincial and district agriculture and forestry offices exercise management at the lower levels.

In addition, STENO was established in 1993 under the Prime Minister's office. STENO has a mandate to provide cross-sectoral coordination within the framework of the EAP, and it is responsible for Lao PDR's role in furthering the purposes of international conventions to which it is a signatory.

CPAWM is the national focal point for biodiversity conservation. It has two technical components: Protected Areas Division (PAD) and Watershed Division (WD).

PAD's functions are:

- To provide advisory services to the government on matters relating to biodiversity conservation.
- To establish and refine the NBCA system.
- To provide advisory services to local authorities, and field staff for management planning and implementation
- To monitor management implementation.

- To acquire and analyse survey data, and prepare statistics needed for conservation planning and monitoring.

There are currently 20 NBCAs, most of which are under some form of active management (see below for a full inventory). Most NBCAs are the responsibility of the country's provincial administrations, with support provided by CPAWM as outlined above. The Ministry of Defence manages one NBCA (Phou Khao Khoay), and the same ministry has a presence in Nam Phoun NBCA. The reasons for military involvement originate in matters of security that affected these areas in recent times.

In addition to protected areas, CPAWM's responsibilities cover wildlife management in general, watershed management and management of wetlands although the functions of its WD have yet to be defined; and it has sections that provide services in conservation education and extension and database management.

A three-zone zonation system applies to NBCAs:

- totally protected zones;
- controlled use zones; and
- corridor zones.

Management plans are under development for several NBCAs.

Total manpower resources available for managing NBCAs and for wildlife conservation in general (in March 1999) numbered 228. This comprised:

- | | |
|-----------------------------|----|
| • CPAWM | 55 |
| • Provincial forest offices | 80 |
| • District forest offices | 93 |

Thirty-three are technically qualified, and three have postgraduate degrees. Technical qualifications are in varied subjects including forestry, economics and law.

Funds available to NBCA management amount to around 2 billion kip (about US\$465,000 in February 1999). Ninety-nine per cent comes from donors.

CPAWM also works with the Ministry of Foreign Affairs and STENO to ensure that Lao PDR adheres to environmentally related international agreements to which it has acceded (see above).

An important initiative currently being developed is that of Trust Funds for conservation and watershed management. When developed they could provide greater long-term security, and have a marked beneficial effect upon conservation.

5.2. NGO and donor involvement

Decree 164 had a marked affect upon biodiversity conservation in that it led to increased interest and support by donors and NGOs. The list is an impressive one.

- **Bilateral aid:** Canada, Denmark, Finland, Germany, Japan, the Netherlands and Sweden.
- **Multilateral aid:** ADB, EU, FAO, GEF, IUCN, MRC, UNDP and the World Bank.
- **Volunteer groups:** DED (Germany), OSB (Australia), VSA (N Zealand) and VSO (UK).
- **NGOs:** CESVI (Italy), Earth Island Institute (USA), German Agro Action, MacArthur Foundation, Population Development International (Thailand), Wetlands International, WCS, Wild Bird Society of Japan and WWF.

Every NBCA and five of the proposed NBCA's had, by February 1999), received assistance from outside sources.

5.3 Private sector involvement

Private sector involvement is slight. One company is trying to develop a tourist programme in Nam Kan proposed NBCA, incorporating support from local villagers. Another is developing a casino at the edge of Phou Khao Khoay NBCA.

Electricite Du Lao provides a part of the operational budget: 0.1 per cent of revenue earned from the sale of hydroelectric power is used to support resource management in the watershed where power was generated.

6. INVENTORY OF PROTECTED AREAS

No inventory exists for provincial or district protected areas. According to informed sources there are over 1,000, and CPAWM is currently preparing an inventory. They are classed as:

- provincial conservation forests;
- provincial protection (watersheds) forests;
- district conservation forests; and
- district conservation (watersheds) forests.

The 20 declared NBCAs and 11 proposed ones are listed below. Most are now under management with donor support.

National biodiversity conservation areas (IUCN management category IV)

	<u>Size km²</u>
1. Dong Ampham	1,975
2. Dong Hua Sao	910
3. Dong Phou Vieng	1,980
4. Hin Nam Nor	865
5. Nakai Nam Theun	3,710
6. Nam Et	1,915
7. Nam Ha (East)	445
8. Nam Kading	1,740
9. Nam Phoun (Poui)	1,150
10. Nam Xam	580
11. Phou Den Din	1,310
12. Phou Hin Poun	1,580
13. Phou Khao Khouay	1,390
14. Phou Loey	1,465
15. Phou Phanang	700
16. Phou Xiang He	1,060
17. Phou Xiang Thong	995
18. Xe Bang Nouan	1,260
19. Xe Piane	2,665
20. Xe Sap	1,335
<u>Total NBCAs</u>	<u>29,030</u>

Proposed NBCAs (IUCN management category PRO)

	<u>Size km²</u>
1. Bolovens Northeast	935
2. Bolovens Southwest	620
3. Dong Khantung	1,500
4. Nakai-Nam Theun Extension	645

5. Nam Chuan	1,610
6. Nam Ha West	1,025
7. Nam Kan	775
8. Nam Theun Corridor	620
9. Phou Kathong	880
10. Phou Theung	1,130
11. Xe Kampho	780

Total proposed NBCAs 10,520

Some proposed NBCAs are regarded by their provincial authorities as being *de facto* NBCAs.

7. CONSERVATION COVER BY PROTECTED AREAS

The area occupied by protection and conservation forests is over 80,000 km²—33.3 per cent of Lao PDR, and 76 per cent of recognised forest estate. Exactly where they are is not easily discovered. There is no map showing their locations, neither are they demarcated on the ground. Anecdotal reports assert that their locations are known only to provincial or district agriculture and forestry offices, and then only informally as 'that mountain' or 'that watershed'. Their management and usefulness are a mystery.

The area occupied by NBCAs is 29,030 km² – 12.3 per cent of the country. If all 11 proposed NBCAs were approved and declared the total would become 39,550 – 16.8 per cent.

The NBCAs are well distributed across the sub-units identified in section 1.2, and Berkmuller *et al* (1995) observed that although there had been a dramatic decline in evergreen most of what remained was inside the new NBCA system. However, MacKinnon (1997) recorded that the system included '*almost no protected examples of tropical and subtropical pine forests; very little subtropical broadleaf forest and a general bias towards the moister (admittedly richer) forest types*'. The proposed NBCAs would help to plug these gaps.

Although gaps remain to be filled in floral and faunal data, the foregoing account supports Chape's (1998) assertion that Lao PDR has developed 'one of the most representative protected area systems in Asia'.

8. AREAS OF MAJOR BIODIVERSITY SIGNIFICANCE

Xe Piane NBCA

Generally low lying terrain on the border with Viet Nam, with extensive flats to the south and east. Vegetation cover comprises semi-evergreen, dipterocarp and mixed deciduous forests. Gaur, kouprey and banteng occur, moving to and from across the border with Cambodia. Asian elephant, tiger and leopard occur, and Sumatran rhinoceros may survive. Dolphins inhabit the river. Several threatened birds occur: e.g., giant ibis, white-shouldered ibis and lesser adjutant.

Nakai Nam Theun (and its proposed extension/corridor)

Mountainous terrain on the border with Viet Nam, rising to over 2,000 metres. A large area of Annam wet and dry evergreen forest and coniferous forest. Mammalian fauna, includes Asian elephant, gaur, banteng, Asiatic black bear, sun bear, leopard and tiger, plus the recently discovered saola and giant muntjac.

Phou Dene Dinh

Ruggedly hilly terrain in the extreme north on the border with Viet Nam, rising to nearly 2,000 metres. A mosaic of high forest, newly cleared areas and fallow. Asian elephant, gaur, banteng, Asiatic black bear, sun bear, leopard and tiger are believed to occur.

Phou Khao Khoay

Predominantly hilly terrain north of Vientiane with impressive scenery. Vegetation cover comprises evergreen and coniferous forest plus heath and scrub. Mammal fauna includes Asian elephant, tiger and gibbons.

Dong Ampham NBCA

Ruggedly hilly terrain on the border with Cambodia. Well forested, mostly with mixed deciduous forest plus evergreen forest. Mammal fauna includes Asian elephant, gaur, Asiatic black bear, sun bear, leopard and tiger. Dolphins occur in the Xe Kaman River, which forms the northwestern boundary.

Hin Namnor NBCA

Outstanding area of karst limestone on the border with Viet Nam. Fine scenic amenities. A little studied area that contains pristine limestone forest. Mammal fauna is known to include two langurs, tiger and (provisionally) giant muntjac.

Nam Chuan (proposed NBCA)

Hilly to mountainous terrain along the border with Viet Nam, rising to over 2,000 metres. Heavily forested (98 per cent) of which 59 per cent is dense mature forest. Fauna surveys have yet to be made but the area is within the likely range of saola.

Phou Hin Poun NBCA

Outstanding area of karst limestone in central Lao PDR. Fine scenic amenities. Vegetation cover comprises limestone vegetation, mixed deciduous and evergreen forests. Mammal fauna includes Asiatic black bear, sun bear, leopard and tiger.

9. TOURISM IN PROTECTED AREAS

The government is reported to be looking for ways of encouraging the private sector to take part in management, principally in ecotourism, but no policy decision has been made. There is said to be some opposition to ecotourism based upon the belief that visitors should not be allowed to see the less developed aspects of Lao PDR. This is, of course, exactly what ecotourists come to experience, and which some countries (especially in eastern and southern Africa) put to good economic advantage.

Day visitors find their way to at least two NBCAs: Phou Khao Khoay (a day trip from Vientiane) and Dong Hua Sao (a day trip from Pakxe).

Possibilities for developing tourism elsewhere in NBCAs are being considered, and proposals for relevant regulations are under development. Ecotourism, including sport hunting, may be introduced one day. Also at a later stage, other categories of protected area (e.g., national park or nature reserve) may be declared, and selected NBCAs redesignated as appropriate.

10. COMMUNITY PARTICIPATION

All Provincial and District Forests, and almost all NBCAs, have settlements within them, whose inhabitants cultivate rice and other crops, and practice consumptive uses of selected resources such as fuelwood, medicinal plants and wild animals. All NBCAs also have settlements nearby that exert adverse pressures upon them. There are great differences in the ways that different NBCAs are used by local people although most have inhabitants within, and all have inhabitants nearby who harvest resources.

Unlike its neighbour Thailand, most harvesting in Lao PDR is for subsistence purposes although wild animals and some roots and fruits are gathered for export to China and elsewhere.

The government is committed to a participatory approach to protected area management, involving people who live in or nearby them. Active participation by people living in NBCAs is considered therefore to be a crucial component of management. Responsibility for management is delegated to villages through a system of locally negotiated rules that trades continued access to selected non-wood forest products in exchange for assisting law enforcement efforts (Kingsada, 1998). Currently participation is being developed in:

- decision making on boundary delineations;
- drawing up acceptable general codes of conduct in NBCAs;

- drawing up acceptable regulations for core (intensively managed) zones; and
- decision making on appointing guardian villages that will be responsible for protecting NBCAs after questions over use privileges have been resolved.

11. GENDER

All seven staff members in the Protected Areas Unit of CPAWM are men. In the Wildlife Conservation Unit, eight are men and one a woman. The staff of provincial and district forest offices comprise 142 men and 14 women. The few women employed occupy relatively junior positions.

At community level, men predominate in most decision-making situations. Women tend to be sidelined. Collaborative management programs have to make special efforts to include women, and may have to set up separate meetings for them.

12. CROSS BOUNDARY ISSUES

12.1 Internal boundaries

Being managed by 17 different provincial administrations, management procedures vary between provinces and districts. In some cases individual NBCAs straddle provincial or district boundaries, leading to conflict. Bickering arises between districts, which are apt to blame their neighbours where problems such as law breaking occur.

At the administrative level squabbles arise over differential cash releases, especially where a donor is involved who releases all the financial support for a specific NBCA to one province or district only. In an attempt to avoid this in supporting development of Nakai-Nam Theun NBCA, the World Bank has made it a conditionality that management comes under central government.

Current development activities in CPAWM are aiming for a uniform approach to protected area management and planning, leading to a truly national NBCA system.

12.2. International borders

Several existing NBCAs are adjacent to international borders. Those marked with asterisks are contiguous with protected areas across the borders.

Adjoining Viet Nam

Nam Xam
 Nam Et *
 Nakai Nam Theun *
 Phou Den Din *
 Hin Nam Nor *
 Xe Sap

Adjoining Cambodia

Xe Piane
 Dong Ampham *

Adjoining Thailand

Nam Phoun
 Phou Xiang Thong *

Collaboration with neighbouring countries is being developed as a means of finding solutions to management problems with protected areas that lie along international frontiers. UNDP and WWF support a Regional Biodiversity Forum involving Lao PDR and Viet Nam.

12.3. Cross border trade

Large consignments of illegally taken wild animals and their by-products, including species covered by CITES (to which Lao PDR is not a signatory), flow eastwards across the border into Viet Nam. An IUCN report (Anon. 1998b) recorded trade routes from Lao PDR (and Cambodia) into Viet Nam, from within Viet Nam itself, and then via Hanoi to China, which has an 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 crossing points between Lao PDR and Viet Nam, over which wildlife is exported. Major routes pass from Khammouane and Savannakhet Provinces into central Viet Nam and thence to Hanoi. Another route from Huaphan Province passes directly to Hanoi.

Reptiles and small mammals make up the bulk of the trade. Birds are found 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.

There is also an illegal flow of NTFP from Lao PDR to Thailand. This includes supplies to feed a major illegal market in maidam (*Aqualaria* sp) in the Middle East and Japan, where it sells for up to \$2,000 a kilogram, and which has all but eliminated the plant from Lao. Finally, illegally obtained timber crosses from Cambodia into Lao PDR, mostly for onward transfer to Thailand.

13. MAJOR PROBLEMS AND ISSUES

13.1 Deforestation

Deforestation is a continuing problem although under better control than at the start of the decade. In southern and central regions land cleared by logging tends to be taken over for agriculture by lowland farmers and shifting cultivation. In northern areas the spread of shifting cultivation is more pronounced although little intact forest remains there.

Before 1996 exploitation was largely uncontrolled. The Forest Law of 1996 introduced a much-needed basis for establishing categories of forest, the uses to which they could be put and provide for granting tenure to traditional land users.

The government is generally optimistic in its bid to halt losses in forest cover, from both uncontrolled logging and shifting cultivation, so that it can retain most of the country's existing forest cover, including representative tracts of virgin forest (Kingsada, 1998). But the prospects for retaining viable populations of key wild flora and fauna are less certain.

13.2 Low management capacity

Numbers of personnel are low in comparison with the enormous size of the existing NBCA system. So are professional and management skills. Capacity is particularly low in the ability to produce maps, monitoring, fact finding and developing participatory programmes. The addition of more areas would place even greater demands for heightened management capacity.

13.3 Uncertain financial resources

While the protected area system is extensive, and the strategies for watershed management appear sound, financial resources are slim. Protected area management is almost wholly dependent on donor support. At present the government cannot justify taking loans to finance conservation projects, nor is its infrastructure sufficiently developed to support an ecotourism industry that might provide income.

The principle of a Trust Fund forms part of EAP's strategy. If donors can develop a Trust Fund, similar to those already established in Bhutan this could guarantee a long-term flow of conservation income.

13.4 Uncontrolled trade in wildlife

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

13.5 Hydropower development projects

Current proposals or plans for dams and reservoirs, if implemented, will erode biodiversity by submerging habitat and animal migration routes, and, through road development, will open up further tracts of land to exploitation.

13.6 Size of the protected area system

The NBCAs have been declared with biodiversity conservation and representativeness firmly in mind but this has resulted in an admirably designed protected area system that covers over 12 per cent of total land area; and in the wings are further proposed areas that would increase cover to over 16 per cent. Few countries in the world have so high a proportion of land under IUCN management categories I to IV. It must seriously be questioned whether even the extant system can be brought under effective control in the foreseeable future, while rising rural populations continue to exert increasing demands upon unoccupied land.