REVIEW OF THE NATIONAL PROTECTED AREA SYSTEM OF LAO PDR

William Robichaud, Clive W. Marsh, Sangthong Southammakoth, Sirivanh Khounthikoummane

Lao-Swedish Forestry Progamme

Division of Forest Resources Conservation (Department of Forestry)

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Vientiane
2001

Dedicated to the memory of

Dr. Clive Wallis Marsh

(1951 - 2000),

a friend of Laos and its protected areas.

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ABBREVIATIONS, ACRONYMNS AND CONVENTIONS

Abbreviations and Acronyms

ASEAN	Association of South East Asian Nations
BCP	Biodiversity Conservation Project
CBD	Convention on Biological Diversity
CF	Conservation Forest
CPAWM	Centre for Protected Areas and Watershed Management
CUZ	Controlled Use Zone
DAFO	District Agriculture and Forestry Offices
DANIDA	Danish International Development Agency
DFRC	Division of Forest Resources Conservation
DoF	Department of Forestry
FINNIDA	Finnish International Development Agency
FOMACOP	Forest Management and Conservation Project
GEF	Global Environment Fund
GoL	Government of Lao PDR
GSD	Geological Survey Department
IUCN	The World Conservation Union
MAF	Ministry of Agriculture and Forestry
MRC	Mekong River Commission
NAFRI	National Agriculture & Forestry Research Institute
NBCA	National Biodiversity Conservation Area
NGO	Non Government Organization
NOFIP	National Office of Forest Inventory and Planning
NTFP	Non-Timber Forest Product
NUOL	National University of Laos
PA	Protected Area
PAFO	Provincial Agriculture and Forestry Offices
PM	Participatory Management
Sida	Swedish International Development Cooperation Agency
STEA	Science, Technology and Environment Agency
STENO	Science, Technology and Environment Organization
TPZ	Totally Protected Zone (of an NBCA)
WCPA	World Commission on Protected Areas
WCS	Wildlife Conservation Society
WHC	World Heritage Convention
WWF	World Wide Fund for Nature Conservation

Conventions

Laos: Used for the geographic entity, currently or historically, enclosed by borders of the Lao state.

Lao PDR: Used for the political entity of the Lao state, founded December 2, 1975.

A REVIEW OF THE NATIONAL PROTECTED AREA SYSTEM IN LAO PDR

Executive Summary

BACKGROUND

The biogeographic design of the Lao protected area system is one of the best in the world. This, coupled with the government's progressive policy of participatory management, is a foundation of great promise for biodiversity conservation in the country. The challenge now is to move from promise to realization.

The Lao protected area system has developed within one of Asia's poorest and least populated nations. The current population is about 5.2 million, and growing at about 2.8% per year. On a Human Development Index that combines *per capita* income, literacy and life expectancy, in 1999 Laos ranked 140th out of 174 countries in the world.

Lao PDR's geographic position in the center of neighbors that have more than 10 times its population but markedly less relative forest cover and hydropower potential (Thailand, Vietnam and Yunnan, China) has put pressure on the land of Laos far and above that generated by its own population. Timber and hydropower exports are two of the largest earners of foreign income for Lao PDR.

The system of National Biodiversity Conservation Areas (NBCAs) is new, having been legally decreed in only 1993, with two other areas added later for a total of 20. The system covers between 12-14% of land area. It was created on two foundations:

1. Policy came from GoL's commitment to forest conservation, especially as expressed in the Tropical Forestry Action Plan of 1990.
2. Design philosophy and criteria for site selection were based on the biogeographic analyses of MacKinnon and MacKinnon (1986).

Specifically, the system's design goal was to "provide effective protection to 5-20% of the original area of each habitat type within each biogeographic subunit" in Lao PDR. While the area under protection is a large, all NBCAs are in reality multiple use areas. None are strict national parks or wilderness reserves as found in some other countries.

CURRENT STATUS

Legal and Policy Framework

NBCAs are the only national-level areas devoted to nature conservation. There are no separate wildlife sanctuaries or similar, nationally managed areas.

According to Prime Minister's Decree 164 that established the system, the NBCAs (or "National Conservation Forests" in Lao) have three objectives:

(i) protection of forests, wildlife and water
(iii) maintenance of natural abundance and environmental stability
(iii) protection of natural beauty for leisure and research

The Forestry Law of 1996 made the NBCAs one of five legally defined forest types in Laos:
Article 18: Conservation Forest is forest and forest land set aside for the purposes of conservation of fauna, flora, nature, and various things of historical, cultural, touristic and environmental value and for scientific study and research.

Application of the Forestry Law to NBCAs will be clarified by implementing regulations for the Law. A draft has been submitted to MAF for comment and approval.

The Lao approach to protected area management is more advanced than other more 'developed' Asian nations. This stems from three GoL policies:

- *Management should benefit NBCA residents*
- *Management should proceed in a participatory manner with residents*
- *Management implementation should be delegated to local government*

In view of the 'multi-use' objectives and roles of the NBCAs, most NBCAs are consistent with IUCN Category VI Protected Areas: Managed Resource Area. Some may be appropriate as Category II, National Parks.

Institutional Structure

DoF's Division of Forest Resources Conservation (DFRC) is the national focal agency for the coordination of NBCA management. It is mainly a service organization, providing technical assistance to the local level, coordination with donor projects, and information to policy-makers in DoF/MAF. The coordination of NBCA management between central and local level Ideally follows this hierarchy:

DoF:	Policy formulation
DFRC:	Policy dissemination to provinces and NBCA; Technical assistance to provinces and NBCA; Coordination of donor projects;
Province:	NBCA Head; Management planning;
Districts:	NBCA staff; Management implementation;

Because districts are responsible for implementation, close coordination between them and donor management projects is key.

Biodiversity Significance of the NBCAs

There are several habitats and ecosystems of high regional and global significance within the NBCAs. The most important are:

- Evergreen Forests of the Annamite Mountains and foothills
- Central Indochina Limestone Karst
- Dry Dipterocarp Forests of the Mekong Plain
- Bolavens Plateau
- Northern Highlands
- Mekong River

The Lao NBCA system is internationally important to the conservation of many species. For example, Hin Nam No NBCA is home to seven species of diurnal primates, all of global conservation concern. Nakai-Nam Theun NBCA harbors at least 430 species of birds, 1/25th of all bird species in the world, and as high a bird diversity as any nature reserve in SE Asia. Laos and its NBCAs are also home to several newly described and threatened mammals, such as Saola, Large-antlered Muntjac and Annamite Muntjac. About 1/3 of the plants of the Indo-Chinese biogeographic sub-region are endemic, and most are found in biogeographic sub-unit 10, which covers most of Laos. The Indo-Burman region, which includes Laos, is one of the world's global biodiversity "hotspots".

Human Diversity

A potentially significant role for NBCAs is conservation of the cultural heritage and diversity of Lao PDR. More than 230 languages are spoken in Laos, some by groups who live only in NBCAs. Indigenous peoples can contribute to conservation, as well, because many of their

livelihood systems have evolved to maintain the diverse biological resources on which they depend.

Economic Benefits Of NBCAS

Sustainable rural livelihoods

According to government policy, "development" in NBCAs does not refer to large projects such as roads, dams resorts, etc., but livelihood improvement for local people. Therefore, both a benefit of NBCAs and a tool for their management is assistance to sustainable livelihoods of NBCA residents. Poverty alleviation and forest conservation through improved agriculture and income generation are critical steps.

Hydropower development

GoL sees a limited role for NBCAs to contribute to hydropower development, beyond their simple but important function of watershed protection. This is demonstrated by the completed or proposed construction of hydropower projects which lie in, or have significant affects on, eight or nine NBCAs. Policy is to contribute some hydropower revenues to the management of affected NBCAs.

Ecotourism

Ecotourism in NBCAs, if carefully planned and managed, and done with the participation of and benefits to key local stakeholders, can contribute both to the national economy and to NBCA management. A successful project is underway near Nam Ha NBCA, pilots have been tried in Xe Pian, Dong Houa Sao and Phou Xang He, and plans are being developed for Phou Khao Khoay.

Local economies

The value of non-timber forest products (NTFPs) consumed annually by the average rural Lao family has been estimated at US$280. This is the equivalent of $224 million per year nationwide, and represents 20% of GNP. The total would be far higher with two adjustments: cash-income value of NTFPs were added, and wildlife was considered an NTFP. The figure is probably far higher for residents of the more than 1,000 villages in or near the rich forests of the NBCAs. Clearly, conserving the biodiversity of Laos also helps to secure the tenuous economic security of much of its population.

National economy

The national economic values of NBCAs are diverse, including maintenance of watersheds for flood control, irrigation, fishing, hydropower and village use, and for climate stability to the benefit of agriculture. A detailed assessment of the national economic contribution of NBCAs should be made a component of the upcoming National Biodiversity Strategy and Action Plan.

Pressures On NBCAS

Pressures can be *internal*, from NBCA residents, or *external*, from outsiders and commercial enterprises. All are made worse by population expansion. Significant pressures in the NBCAs are:

- *Unsustainable agricultural practices*
  Both subsistence and cash-crop agriculture place pressure on NBCAs to varying degrees.
- *Livestock grazing*
- *Timber extraction*
  This can be small scale cutting by local residents, or unregulated commercial logging.
- *Infrastructure development*
  The main infrastructure pressures on NBCAs are roads and hydropower projects. Hydropower dams have been built or proposed that affect or could affect 8 or 9 NBCAs. GoL policy dictates that some of these hydropower projects compensate for their impacts by contributing financially to NBCA management.

There seems to be an under-appreciation of the magnitude of biodiversity loss that can follow construction of any type of road into an NBCA. When roads in or near NBCAs are necessary, GoL, biologists and NBCA management should cooperate to plan a route that minimizes damage to biodiversity.

- *Forest burning*
  Forest fires are a significant problem is some NBCAs (e.g., Xe Bang Nouan) and little problem in others. Village fire prevention units have been formed in some NBCAs.
- *Collection of non-timber forest products (NTFPs)*
  It is unlikely that subsistence collection of NTFPs by protected area residents is a threat to any NBCA. However, the commercial collection of NTFPs in protected areas is a significant conservation issue.
- *Hunting*
  Like NTFP collection (and wildlife could be considered an NTFP), the impact of hunting on NBCAs varies depending on whether it is done for subsistence or trade. Hunting for trade is one of the principal causes of biodiversity loss in many NBCAs.
- *Fishing*
  Villagers in NBCAs often report steadily decreasing size and quantity of fish caught in their local watercourses over the years. Depletion of fish stocks by subsistence fishing is exacerbated by commercial fishing. This in turn intensifies pressure on other wildlife as alternative protein sources.

Opportunities

Although pressures on NBCAs are high, there are also opportunities inherent to Laos that provide starting points for successful protected area conservation. These include:

- *The nation's low population density*.
- *Lao people's absence of prior negative experience with protected area management.* The strife that has sometimes occurred between villagers and PA management in other countries is unknown in Laos. This gives NBCA managers a chance to start relationships with local people based in trust and free of suspicion.
- *GoL commitment to local participation in management.*
- *Traditional livelihood systems that converge with protected area priorities*: Many local people in NBCAs *already* manage local natural resources sustainably. This offers a valuable entry point for NBCA management.
- *Traditional conservation practices:* Many communities in NBCAs practice indigenous forms of biodiversity conservation. Examples are the maintenance of protected 'spirit forests', and taboos on the killing of certain species of wildlife.
- *Absence of firm boundaries to most NBCAs:* Local people can be involved in determining where the exact boundaries should be, something that was not possible when the system was decreed. This should help to forestall future conflicts between NBCA residents and management.

NBCA Management

Almost all NBCAs have had at least a brief biodiversity survey. Fifteen of the areas have begun management activity, usually assisted by donor projects lasting 3-5 years. GoL feels that Integrated Conservation and Development (ICAD) is the most suitable approach in the Lao context. It is important to pair it with a Participatory Management approach, which includes not only participation of villagers, but of other stakeholders such as district and provincial governments. Other projects that support NBCA management are land allocation/land use planning, gun collection, public awareness, ecotourism and the IUCN/NAFRI Non-Timber Forest Products Project.

ANALYSIS

Achievements

Principal achievements in Lao national protected area conservation are:

- *A scientifically designed protected area system.* Lao PDR has legally defined an integrated set of protected areas designed as a system on sound scientific principles. This achievement is matched by few countries in the world.
- *An appropriate commitment of area.* IUCN has recommended that nations designate 10% of their land as biodiversity conservation areas, and Lao PDR exceeds this by 2-4%.
- *A sound information base.* GoL has guided an impressive collection of information on NBCA biodiversity. It was collected under the auspices of DoF into the exhaustive publication *Wildlife in Lao PDR: Status Report 1999*. No summary of similar comprehensiveness exists for any other Indochinese country.
- *Progressive management policy.* Management planning for the NBCAs has been guided by DoF's clear and progressive policy to involve local stakeholders, in a cooperative rather than confrontational approach.
- *Management implementation.* Management projects have started in most NBCAs. While effectiveness has been variable, they have established a foundation of 'lessons learned' for future progress. Much of this experience has been incorporated by DoF and DFRC into a *Manager's Guide to Protected Area Management in Lao PDR.*

Legal And Policy Issues

Clearer communication of GoL policy on the objectives of the NBCAs would be helpful. The distinction between conservation as an *objective* and rural development as a *method* to achieve that objective is sometimes not clear to stakeholders. One NBCA Head reported that he found it difficult to plan management for his NBCA because he was not sure if the objective of the area should be biodiversity conservation or rural development.

The precise boundaries of most NBCAs are still unclear. This puts a constraint on management planning. But it also provides an opportunity to involve local residents in deciding where the boundaries should be.

Institutional Arrangements

Staffing

The staff of DFRC is smaller than needed to fulfill its tasks of national NBCA coordination and provision of technical services to the local level, such as GIS and training. Staff levels are also low at most NBCAs, but DoF has made the important point that increasing staff *numbers* will not improve NBCA management unless the staff work in the field, with villagers. There is also a gender imbalance, with insufficient numbers of women available for fieldwork.

Interlevel communication and coordination

Weak communication and coordination between NBCA staff and district and provincial governments, and between district and provincial governments and the central level, sometimes results in activities that damage NBCAs.

Furthermore, NBCA staff express a need for more guidance from the central level on NBCA policy and management methods. While the policy to delegate management responsibility to the provinces and districts is good in many respects, alone it is not enough to achieve effective NBCA management. Along with responsibility, NBCA staff need to be given *regular* on-site guidance, encouragement and supervision from DFRC.

Distribution of responsibility and authority

DFRC has responsibility to coordinate management of 20 protected areas, as well as nationwide wildlife conservation, in one of the most important countries for biodiversity conservation in SE Asia. This is a huge task. Yet DFRC's authority to choose and take action to fulfill this responsibility is limited.

Likewise, there is a large difference between the magnitude of an NBCA Head's *responsibility* and the magnitude of his *authority* to fulfill that responsibility. NBCA Heads report that other government agencies often do not consult them before commencing damaging activities in the NBCAs, such as road construction or the extraction of natural resources. Nor do the NBCA Heads have the authority to stop such activities when they begin.

Institutional Commitment

The principal constraint to management progress at *some* local levels is not shortage of funds, staff, or management expertise. It is a lack of understanding of the reasons the NBCAs have been established, and their importance to the nation. The consequence is sometimes weak local government commitment to management, and approval for some activities that damage the NBCA. Until greater commitment to protection of the NBCAs is fostered locally, further investments in management will have limited success. This is particularly true in light of the weak position of the NBCA Head.

System Design

The NBCA system has generally met its goals of representative coverage of key habitats within each of the biogeographic subunits in Laos. The most important underrepresented habitat is wetlands, including the Mekong River. Some other key habitats for which representation is marginal are Evergreen Forest, Conifer-Mixed Conifer Forest and Dry Dipterocarp Forest. The most globally important ecosystem in Laos are the forests of the Annamite Mountains.

While one design weakness was the low level of villager involvement in determining the NBCA boundaries, because the boundaries remain inexact the opportunity to do this remains.

NBCA Prioritization

Ranking or prioritizing the importance of protected areas entails risk. While calling attention to high value areas, it could give the impression that areas lower on the list are expendable. In the case of the Lao NBCAs this would be incorrect. The NBCAs are an integrated conservation *system*. Nonetheless, human, financial and political resources for conservation are limited, and it is important to identify where investment will yield the best conservation return.

NBCAs were prioritized by assessing their biodiversity contribution to the NBCA system. The highest ranking NBCAs are:

- Nakai-Nam Theun
- Xe Pian
- Xe Xap
- Hin Nam No and/or Phou Hin Poun (they are similar, and somewhat interchangeable)
- Nam Et/Phou Loey, Nam Ha, and/or Phou Dendin (again, these areas similar biologically; It is difficult to say which is more important, but if one of the group is conserved to a high standard, urgency for conserving the others drops somewhat).

If the importance of Lao NBCAs is considered *exclusively in an international, ecosystem context* and not as a national system, priorities change. That is, if Lao PDR focuses on conserving its ecosystems that are most distinctive and limited globally, then highest value sites are the Annamite Mountain NBCAs (and NBCAs of the associated limestone block), and lowland evergreen forest:

Dong Ampham	Phou Hin Poun
Hin Nam No	Xe Pian
Nakai-Nam Theun	Xe Xap

Next, the biodiversity assessments of the NBCAs were combined with assessments of their watershed values, ecotourism potential, and levels of pressure to yield a numerical "Management Priority Score". NBCAs of highest overall management priority are:

Nakai-Nam Theun	Phou Dene Din
Xe Pian	Dong Ampham
Nam Et/Phou Loey	Hin Nam No
Nam Ha	Phou Xang He
Phou Hin Poun	Xe Xap
Dong Houa Sao	[possibly Dong Phou Vieng]

Management Progress

The World Commission on Protected Areas (WCPA) has developed criteria for scoring the management status of a protected area. This review adapted it for the Lao NBCAs, selecting 12 management topics on which each NBCA was scored 0,1,2 or 3 (basically, 'poor' to 'excellent' management progress). The purpose of the exercise was **not** to compare the NBCAs to protected areas in other countries. Instead, the reasons were:

1. To compare the NBCAs to one another in 2001 so that management gaps can be identified and clarified.
2. To allow comparison of an NBCA in 2001 to itself again in few years when the exercise could be repeated. It is a tool to monitor management progress and the effectiveness of donor assistance.

The sum of the 12 scores for each NBCA were divided by the maximum possible total, 36 (12 topics x 3 points maximum each), to arrive at a 'Management Progress Index'. The results, listed with the Management Priority Scores (described above) are:

NBCA	**Management Priority Score**	**Management Progress Index**
Nakai-Nam Theun	13	.36
Xe Pian	12	.50
Nam Et/Phou Loey	11	.39
Nam Ha	11	.33
Phou Hin Poun	11	.36
Dong Houa Sao	10	.44
Phou Dene Din	10	.14
Dong Ampham	9	.22
Hin Nam No	9	.36
Phou Xang He	9	.44
Xe Xap	9	.28
Phou Khao Khoay	8	.50
Dong Phou Vieng	7	.28
Nam Pouy	7	.42
Nam Xam	7	.17
Xe Bang Nouan	7	.31
Phou Phanang	6	.17
Nam Kading	6	.14
Phou Xieng Thong	5	.47

The results indicate that management attention has not always been targeted where needed most. This is partly because many NBCA management projects started before much was known about the individual significance of the NBCAs. Among the highest priority sites for immediate increased management attention are:

Nakai-Nam Theun
Phou Dene Din
Dong Ampham
Xe Xap

OPTIONS

Options to Strengthen NBCA Legal Standing and Policy

- The implementing regulations on protected areas to the Forestry Law should be worded to accurately reflect GoL policy on the purpose and objectives of the NBCAs. Consideration should also be given to defining the areas in terms of the standard IUCN protected area categories.

- A clear statement of GoL policy on the purpose and objectives of the NBCAs would benefit a diversity of stakeholders. This could be added to the NBCA *Fact Sheets* and the NBCA *Manager's Guide*. A review of relevant decrees, laws and GoL policy statements suggest the following as a possible statement of NBCA objectives:

  The objectives of the NBCA system are the protection of large natural areas for biodiversity, ecological stability, watershed functions, and aesthetic and cultural values for the benefit of the nation as a whole. Achievement of these objectives should proceed through local, participatory management in a way that, whenever possible, benefits traditional residents of the NBCAs and contributes to national development while remaining consistent with the objectives of the areas.

- Donor assistance should be given to form one or more professional, interdisciplinary teams to tour the country and help local authorities define the NBCA boundaries in a participatory manner with key villages. It will be an expensive and long process, but it would be matched by the magnitude of the benefits. Consideration should be given to simultaneously attempting (at least in a preliminary manner) NBCA zonation and land allocation in key NBCA villages.

Options to Improve Institutional Arrangements

Better coordination of NBCA management is needed from the central level. Implementation should remain the responsibility of local government, but the central level should provide more guidance and encouragement. In short, DFRC needs to visit the NBCAs more often.

- DFRC could appoint one or more staff as full-time NBCA liaison officers. His or her sole task would be to periodically visit each NBCA, and its relevant districts. [The job of making periodic visits could also be divided amongst DFRC technical staff according to the donor NBCA project they are assigned to coordinate. A weakness of this approach is that some DFRC technical staff are too junior to meet easily with higher district or provincial officials. Another is that not all NBCAs have donor projects, and for that reason may be the most important ones to visit.]

- Alternatively, DFRC could assign responsibility to three DFRC staff for oversight of all NBCAs in each of three regions: north, center and south. Although based in Vientiane, each 'regional coordinator' would spend extensive time visiting NBCAs from a base at the PAFO office most central to the NBCAs of the region. His or her duties would be to:
  - provide technical assistance, advice and encouragement to NBCA staff;
  - assist NBCA staff to prepare management plans consistent with MAF/DoF policy;
  - see that NBCA staff understand MAF/DoF policy on such issues as land allocation, NBCA boundary demarcation, etc.;
  - demonstrate the central level's interest in the NBCA;
  - serve as a general communication link between the NBCA and DFRC/DoF;
  - provide extra supervision and support to newly appointed NBCA heads;
  - visit district government offices to discuss district plans for development activities that might affect an NBCA;
  - monitor and supervise NBCA donor projects in the field.

- To improve gender balance in management, NBCA projects should routinely invite the participation of the Lao Women's Union.

- Women-only field training courses could be developed at central and local levels, with female trainers whenever possible. This would make it necessary for provinces, districts and DFRC to supply women for training in NBCA work, and would stimulate them to pay more attention to the issue.

- More attention should be focused on teaching local NBCA staff *why* their NBCA should be managed, and not just *how* to do it. This is especially important in the Lao context, where local staff are expected to manage NBCAs with little direct involvement of the central level. Without fully understanding why a particular NBCA is important, and why it was selected for inclusion in the system, staff are unlikely to make best use of the 'how' tools taught to them (survey techniques, mapping skills, etc.).

Options to Improve System Coverage

- If a decision is made to add areas to the NBCA system, the following five should be considered first. All have higher biodiversity importance than many of the gazetted NBCAs.

    - Dong Kanthoung (Champasak Province)
    - Nam Chat/Nam Pan Provincial Conservation Forest (formerly called "Proposed Nakai-Nam Theun Extension"; Bolikhamxay Province):
    - Nam Chouan (Bolikhamxay Province)
    - Xe Khampho (Attapeu Province)
    - a stretch of the Mekong River

- An option to adding more NBCAs to the system is to *exchange* some of the priority proposed areas for gazetted NBCAs of lesser value. That is, some new areas could be gazetted, while existing ones were de-gazetted to provincial conservation forests or other classes of forest. This would improve the quality of the NBCA system while keeping its number of sites and/or its land area constant.

Options to Improve Management

DoF has identified key components of NBCA management in Laos, which have been widely discussed over the years and, in many cases, implemented: *delegation to districts, integration of conservation with rural development, local participation in management, land allocation & land-use planning* and *public awareness/extension activities.*

In addition, there are other, less well-recognized aspects of management in the Lao context which merit attention. All can influence a management project's likelihood of achieving biodiversity conservation in an NBCA. Some may seem trivial, but experience shows that each has significance for the success of PA projects in Laos. They fall under three general topics, *Management Focus, Management Sustainability* and *Project Cooperation and Coordination*.

Management Focus

- *Accurate identification of pressures.*

The pressures on NBCAs are high, biodiversity is being rapidly depleted from the system, and therefore time to act is limited. Consequently, it cannot be stressed enough that it is important for NBCA projects to clearly identify and target the principal causes of biodiversity loss in the particular NBCA in which they work.

- *Improving food security of NBCA residents.*

One of the principal problems facing residents of NBCAs is food security. A common response of donor projects is to try to enhance village livestock (pigs, poultry, cattle, water buffaloes). Yet,

livestock is more important for village *wealth* than food security. Instead (or in addition), co-management projects should focus on improving productivity of traditional wild foods. In Laos, these are mainly fish and aquatic invertebrates. This can be better for an NBCA and the food security of its residents than attempting to increase village livestock. Reasons include:

- Unlike livestock, wild fisheries are a direct contribution to biodiversity, and benefit other species (e.g., otters, kingfishers).
- Livestock are a less secure food source, subject to catastrophic loss through disease, predation and theft.
- Livestock require the expense of vaccines, feed and pens.
- Villagers may be stimulated to kill wildlife predators to protect livestock.
- Reliance on aquatic resources should stimulate villagers to protect streams from poaching.
- Small livestock generate little trade income for remote villages, because eggs and the meat of pigs and poultry cannot be preserved for later transportation to market. Fish, however, can be preserved for later sale.

➢ *Forest Rehabilitation*

More attention should be paid in NBCAs to promoting rehabilitation of damaged habitat. In Controlled Use Zones, this can be done with replantings of trees beneficial to villagers, such as fast-growing species for fuelwood. In the remainder of the NBCA, rehabilitation should focus on setting aside and protecting areas for natural regeneration. Given a chance, some forests can heal. Natural regeneration has numerous advantages over replanting in the context of NBCAs:

- it is cheaper and often more effective
- it allows growth of NTFPs used by villagers
- intermediate stages of young growth are good habitat for many wildlife species
- it results in a richer forest

➢ *Family Planning*

NBCA conservation projects to date have paid little attention to assisting NBCA residents, where appropriate, with family planning. This is despite the fact that:

- large human populations in NBCAs are the ultimate cause of many pressures projects seek to alleviate;
- there are major implications for project sustainability: achievements in land-use planning, enhancement of food security, etc. can be wiped out by expanding populations;
- large families are cited by rural Lao themselves as one of their livelihood problems.

Consequently, future NBCA projects should examine the feasibility and appropriateness of incorporating family planning programs.

➢ *Curtailment of immigration*

Projects and local government need to cooperate to slow the rate of immigration to some NBCAs. This will benefit not just biodiversity, but also the livelihoods of traditional residents.

➢ *Enforcement.*

ICAD approaches take many years to achieve conservation results. In the meantime, implementation of regulations should focus on public awareness-raising rather than penalties. However, there will always be a few individuals (often outsiders who do not benefit from the ICAD project) who violate laws and regulations. Therefore, some emphasis on enforcement is necessary.

Unfortunately, the concept of 'enforcement' is sometimes viewed as a threat to villagers. But in the Lao context it can be a benefit. The illegal extraction of forest resources by aggressive

outsiders is a threat to the livelihoods of local residents of some NBCAs, yet the residents often lack the power or the confidence to stop it. Consequently, some enforcement is critical to the success of participatory ICAD management--it will be impossible to help villagers use forest resources sustainably if the resources are not protected from outside exploitation.

One solution is partnerships between NBCA management and the military. Each district and province has its own contingent of army. The feasibility of assigning some units to NBCAs as park guards should be investigated.

- *Project geographic focus*

Donor projects have not always worked in the most important NBCAs, partly because information was limited when the projects were conceived. Better information is now available, and in the future GoL and donors should cooperate to focus their resources in the highest priority NBCAs.

Similarly, there has been a tendency for individual donors to 'accumulate' NBCAs in an *ad hoc*, dispersed fashion, scattered over several provinces. This geographic dispersion affects project efficiency and effectiveness. Mindful of the need to concentrate effort in the most important NBCAs, donors should focus, whenever possible, on sets of NBCAs within one province.

- *Monitoring*

More resources need to be devoted to monitoring the success of NBCA projects. As a start, DFRC and NOFIP could cooperate to develop a standard protocol for periodically assessing habitat changes to NBCAs from satellite imagery. This would allow early identification of conservation problems.

NBCA projects should also strive to develop on-the-ground programs to monitor biodiversity in their areas. There has been much design and attempted implementation of ICAD-type projects in Laos, but little examination if they are working to conserve biodiversity, or to fundamentally improve the quality of life of villagers. Without such monitoring, the evolution of successful management models is not possible.

- *Database management*

There is a need for a standardized system, between central and local level, for the management of NBCA information. A prerequisite to establishing a database in DFRC is examination of why previously installed systems were not maintained.

- *Landscape approach*

NBCAs are just one facet of conservation within Lao PDR. Situated between NBCAs are protected areas at provincial, district and village level. Consequently, as conservation management in Laos progresses, NBCAs should not be viewed as conservation end-alls, but rather as the most important components of a broader conservation landscape.

Management Sustainability

➢ *Project Duration*

Integrated Conservation and Development Projects need to be funded for 15 or 20 years to be successful. Yet duration of most donor-assisted NBCA projects have been only 3-5 years. This is particularly short in the Lao context. Donors and GoL need to cooperate for longer project commitment to NBCAs.

A common management constraint cited by NBCA Heads is the funding gap between donor projects. Perhaps future projects could incorporate into their budgets modest 'severance' funds to maintain the project's activities for some period after the advisers leave.

➢ *Project Size*

The administrative absorption capacity of GoL is low. This cannot be expanded by a bigger project with bigger funding--that only chokes the government administration and slows the project down. Likewise, the Lao technical capacity to augment donor field projects is severely limited. Consequently, potential donors and GoL should carefully examine the size of the *existing* local staff assigned *permanently* to an NBCA, and design their project to fit.

➢ *Training in participatory techniques*

Good villager participation is of highest importance to most key NBCA management activities. Yet, fostering local participation is a sensitive task which requires special skills. Consequently, to maintain the achievements of donor-assisted management projects once they end, a high priority topic for local staff training is techniques of communication and participatory planning. This should come before training in other skills such as biodiversity survey methods and monitoring.

Cooperation And Coordination

➢ *GoL-Donor-NGO Partnerships*

DoF and DFRC recommend that partnerships between GoL, donors and conservation NGOs work best when the responsibilities of each partner are kept clearly defined, as follows:

DFRC and NBCA: implementation

Donor: funding *NGO: technical advice*

Due to low staff numbers at central and provincial levels, NGOs are sometimes tempted to take over much of the project implementation. This should be resisted as much as possible, and NGOs should remain conscious of maintaining their advisory role. Importantly, this fosters sustainability of project achievements once the project ends.

➢ *NGO-NGO Partnerships*

Successful assistance to rural development is a complex task requiring a diversity of skills and inputs. Biodiversity conservation is similarly challenging. A potential approach to ICAD projects is paired partnerships of development and conservation NGOs. This would fulfill GoL's focus on a development approach to NBCA management, while insuring that the project furthered the prime NBCA objective of biodiversity conservation.

➢ *Transborder Cooperation*

The idea of transborder protected area management is attractive, but reality can prove more difficult. Until Laos has organized effective protected area management on its own side of the border, adding the complexity of transborder cooperation may only slow conservation progress in its NBCAs. At present in Laos, it is *far* more important for NBCA managers to establish better,

more cooperative relationships with other agencies in their *own* country (e.g., provincial and district planning committees) than in other countries.

The Search for a National Management Model

The *Manager's Guide to Protected Area Management in the Lao PDR* has gone a long way to providing a uniform, ICAD-based management model. Given the uniqueness of each NBCA, significant additional progress may not be possible. Each NBCA will require a unique solution to its unique set of management issues. To achieve biodiversity conservation in the NBCAs, the following are perhaps at least as important as a perfect ICAD model (if such a thing were possible):

- Good people. Dedicated, well-supported NBCA managers are probably more important than a good model. To build a quality house it is more important to find a good carpenter than a good hammer. If an NBCA manager is dedicated and creative, he will probably find the right model for his area himself.
- Management flexibility. NBCAs have unique problems, and these change over time. It is critical to embrace concepts of "adaptive management" and monitor and adjust management activities as needed to meet the needs of the NBCA.

Potential Mechanisms to Fund Future NBCA Management

National environmental funds

Article 47 of the Forestry Law permits the establishment of trust funds. However, restrictions in national budgetary laws of Lao PDR are a barrier to implementation. If there is a legal remedy for this, national environmental funds would be an option for the GoL to ensure sustained, stable levels of funding for long-term NBCA management.

Debt swaps

Debt swaps offer countries like Lao PDR the opportunity to reduce their level of external debt, while generating national funds for activities such as NBCA management. Between 1987 and 2000, almost a billion dollars was leveraged though debt swaps around the world.

Carbon offset trading

Carbon trading involves a country that emits carbon dioxide potentially paying another country as compensation for maintaining high levels of forest cover to absorb carbon dioxide.

Public-private partnerships

Although management of protected areas is typically viewed as the responsibility of government, public-private partnerships also offer important opportunities for supporting protected area systems. For example, private tourism businesses can work jointly with government agencies to generate revenue that is reinvested in protected areas.

1 BACKGROUND

1.1 INTRODUCTION

This report has been prepared for, and with, the Lao Department of Forestry (DoF) of the Ministry of Agriculture and Forestry (MAF). It has been written by consultants of the Lao-Swedish Forestry Programme (LSFP) and IUCN–The World Conservation Union, and staff of DoF's Division of Forest Resources Conservation (DFRC). LSFP is the principal donor partnership in the Lao forestry sector, and has been for more than twenty years. DFRC is the technical unit within DoF that has responsibility for the coordination of management in Lao PDR's National Biodiversity Conservation Areas (NBCAs).

This report has been prepared to make the information it contains useful to policy-makers in DoF and other agencies in the Government of Lao PDR (GoL), and to allow translation into the Lao language. Some detailed annexes on auxiliary topics related to the NBCAs have been added, but are not intended to be translated. They contain information that DoF policy makers either already know or is more detailed than they need, but which might be of interest to readers less familiar with Lao PDR and its protected areas.

This is the fifth in a series of NBCA Status Reports produced by DoF/LSFP/IUCN (Salter *et al.*, 1989, Salter *et al.* 1991, Berkmüller *et al.* 1993, Berkmüller *et al.* 1995a). This report is broader than its predecessors, with more emphasis on policy and management issues and less on technical evaluation. This reflects the maturation of the NBCA system.

Specific objectives of the report are to:

1. Briefly document the social, legal and institutional development of the NBCA system.
2. Define the role and the goals of NBCA system in Lao PDR.
3. Outline the contributions of NBCAs to national development.
4. Assess the effectiveness of the NBCAs in achieving their mandated goals.
5. Analyze lessons learned from recent NBCA management projects, and identify options for continued progress in conservation of the NBCAs.

In addition to the national-level NBCAs, provinces, districts and villages can designate conservation forests under their administration. This report focuses on the national system of NBCAs. Local protected areas are discussed to the extent that they affect, or have the potential to affect, fulfillment of the goals of the NBCA system.

While this review has been coordinated by a succession of two foreign technical advisers, it has been completed in a participatory manner, as much as time constraints allowed. Participation and input by GoL, in particular, was fostered in three ways:

1. Completion of the review (after the first adviser, Dr. Clive Marsh, fell ill) was coordinated by one staff from DFRC and an LSFP adviser.

2. The field offices of six NBCAs in five provinces were visited, and lengthy discussions held with their staff.

3. Completion of the review was guided by an interagency 'NBCA review working group' (which met about once weekly during the research phase of the review) composed of the LSFP review adviser, the DFRC review counterpart, the Director of DFRC, the head of the DFRC technical unit (or his deputy), and a senior Lao staff of the IUCN Lao Programme.

4. More than 100 people were interviewed and consulted specifically for the completion of this report. Within the Government of Lao (GoL) they comprised four principal groups:
   - Central staff (MAF, DoF, DFRC) responsible for NBCA policy development, policy leadership, technical support, and national coordination of NBCA management.
   - Provincial Forestry staff, who guide management at the local level.

- Heads of NBCAs, who are responsible for implementing management on the ground.
- GoL biologists and other staff with NBCA field experience.

In addition, international biologists and development workers with Lao NBCA experience, and organizations who have funded and/or provided technical assistance to NBCA projects, were consulted. Several individuals outside DoF with experience in Lao protected areas contributed text boxes on various topics. The purpose is to present DFRC and DoF with outside perspectives on protected area management in Laos. Finally, a draft of this report was reviewed by three external protected area specialists arranged by IUCN.

Time constraints left two important gaps in our sources. Few Forestry staff at the district level (who do most day-to-day management work in NBCAs) were interviewed, nor were many village residents of the NBCAs consulted. Because villagers live and work in the NBCAs everyday, they have the best information on some key issues. Furthermore, under the participatory management models being developed in Laos, they are increasingly helping to implement formal management plans. Many villagers have already been the object of participatory NBCA management projects. That their perspective could not be included directly in this protected areas review is a significant weakness.

Although government staff were interviewed extensively, this report does not reflect a single GoL view on protected areas. The various GoL levels and agencies concerned with NBCAs have unique responsibilities and priorities, and consequently unique perspectives on key issues. This review aimed to compile these various views, organize them into a cohesive whole, and contribute an international perspective.

The review comes at a good time, for several reasons:

- The NBCA system is now eight years old--old enough for various management models to have been tried, but still new enough for management to be in an experimental, learning phase;
- Several of the first donor-supported, multi-year NBCA management projects ended in the past year, and so a compilation of 'lessons learned' is now possible;
- LSFP, the principal donor-funded project in the forestry sector, will draw to a close in early 2001, after almost 25 years of cooperation with MAF and DoF;
- A four-day workshop on NBCA management, involving most heads of NBCAs from around the country, was recently held in Vientiane (September, 2000). This is the most ambitious such meeting ever held in Lao PDR, and provided an excellent forum for a cooperative assessment of the protected area system.

In short, MAF, DoF and DFRC find themselves at a good point to pause and examine the NBCA system, and consider where it is going.

1.2 BRIEF HISTORY OF THE NBCA SYSTEM

The Lao national protected area system is new, having been legally decreed in 1993. Table 1 traces its history and development.

Table 1: **History of the Lao NBCA system**

1986	• Some priority sites for protection in Laos are suggested by MacKinnon and MacKinnon (1986).
1988-1991	• DoF, LSFP and IUCN conduct reconnaissance surveys of potential protected areas; by 1991 eight suitable areas are identified and recommended for management planning; additional areas are identified as priorities for assessment.
1989	• First National Forestry Conference, chaired by the Prime Minister, affirms need for biodiversity conservation • The report, "Needs and Priorities for a Protected Area System in Lao PDR", is issued by LSFP and IUCN.
1990	• Tropical Forestry Action Plan prepared; it reiterates emphasis on forest conservation.
1992	• Assessment and identification of suitable sites for PAs continues; • LSFP/DoF and Cambridge student expedition begin wildlife and habitat surveys in proposed PAs.
1993	• Prime Minister's Decree 164 establishes the first 18 NBCAs; • LSFP begins management planning in four NBCAs.
1994	• Wildlife Conservation Society begins to assist DoF with wildlife and habitat surveys in each NBCA (these will continue through 1999), staff training, and assistance to management in Nam Ha NBCA.
1995	• Xe Xap NBCA added to the system.
1996	• Dong Phou Vieng NBCA added to the system (for a total of 20 NBCAs); • Forestry Law passed by National Assembly; • IUCN Biodiversity Conservation Project (BCP) begins management assistance to two southern NBCAs (later to be joined by German Agro Action and Population and Development International). • GEF/World Bank FOMACOP project begins fieldwork; will work in 4 NBCAs through 2000
1996-1998	• WWF organizes transboundary conservation meetings between Lao PDR and Vietnam; joint Lao-Viet survey of Hin Nam No NBCA in 1998
1999	• Major, donor-advised phases of LSFP, FOMACOP, IUCN, and WCS projects in 11 NBCAs come to an end. Some funds and adviser assistance extended for some areas. • WWF begins assistance to Hin Nam No NBCA. • IUCN/DANIDA begin assistance to Nam Et/Phou Loey NBCAs. • Large extensions approved to Nam Ha NBCA, making it contiguous with an adjoining reserve in Yunnan, China. • World Commission on Protected Areas (WCPA) 2nd Southeast Asia Regional Forum hosted by Lao PDR in Pakxe.
2000	• Four-day NBCA management workshop convened in Vientiane; attended by representatives of every NBCA and chaired by the Director General of DoF; • *Manager's Guide to Protected Area Management* completed; • The first fully approved NBCA ecotourism venture begins (in Nam Ha).
2001	• DoF completes final draft of regulations to the Forestry Law for NBCAs and wildlife and submits them to MAF for approval.

The NBCA system was created on two foundations:

3. Policy came from GoL's commitment to forest conservation, especially as expressed in the Tropical Forestry Action Plan of 1990. GoL's goal was to bring 25,000 km^2 of forest under conservation protection (10.5% of country).
4. Design philosophy and criteria for site selection were based on the biogeographic analyses of MacKinnon and MacKinnon (1986).

Two principles guided the assessment of suitable sites (Salter and Phanthavong 1989):

1. "that protection needs to be provided to the full range of ecosystems and species communities occurring within the country,"
2. "that the total area under protective management needs to be adequate to prevent or minimize species extinctions.

Specifically, the goal of the design process that started in 1988 to was to "provide effective protection to 5-20% of the original area of each habitat type within each biogeographic subunit" in Lao PDR (Salter and Phanthavong 1989). Identification of the subunits was based on MacKinnon and MacKinnon (1986). The approach assumed that protection of adequate, representative areas of habitat would also protect the majority of plant and animals species, so individual species requirements were not considered.

The search for appropriate protected areas started by assessing 68 sites that had been proposed for protection in Lao PDR by various sources. Analyses of the sites (both individually and as a potential system) were based on:

- extent of remaining natural vegetation: 50,000 ha. was the minimum for selection;
- completeness of original cover: priority given to more intact areas;
- extent of representation in biogeographic subunit, based on contributions of altitude classes and habitat types;
- regional priority: according to MacKinnon and MacKinnon (1996) by biogeographic subunit, size, regional importance of habitat, and so forth.
- degree of threat: priority given to high threat areas identified by MAF.

The coverage assessments were based on topographic and forest cover maps. The process identified 29 of the 68 sites as potentially suitable for protected areas (and rejected the others). Ground assessments of most of the 29 were completed by 1991, and 17 suitable sites identified. In 1993 the process culminated in the establishment by Prime Minister's Decree 164 of the 17 recommended protected areas, plus Phou Phanang near Vientiane, added for its historical value. Two more areas were added by Ministerial Decrees in 1995 and 1996, making a system of 20 areas. Some additional NBCAs have been suggested but not legally gazetted.

The NBCAs are shown in Figure 1. The abbreviations used for their names in this report and the provinces in which each NBCA falls are listed in Table 2.

Figure 1. National Biodiversity Conservation Areas

Source: DFRC Mapping and GIS Unit, March 2001

Notes on spelling: For years the romanized names of the NBCAs have been spelled in a diversity of ways, despite the existence of a long-standing system for transliterating Lao letters and diphthongs into romanized script. The names of the NBCAs and provinces in Figure 1 and Table 2 follow this system (with some exceptions to accommodate long-standing conventions, as noted). They have been transcribed with the assistance of Lao scholar Dr. James Chamberlain. **We urge that these spellings be adopted as standard, and used in future writings about the NBCAs.** In particular, 'Phou' ("mountain") is preferable to 'Phu', since the former follows the Lao system while the latter is a Thai convention. So, too, the long 'ee' vowel at the end of word is properly transcribed from Lao as *y*, not *i* as used for Thai.

Table 2: National Biodiversity Conservation Areas

Decreed NBCAs		**Province(s)**
Dong Ampham	**DAP**	Attapeu
Dong Houa Sao	**DHS**	Champasak
Dong Phou Vieng	**DPV**	Savannakhet
Hin Nam No	**HNN**	Khammouane
Nakai-Nam Theun	**NNT**	Khammouane, Bolikhamxay
Nam Et	**NET**	Houa Phanh
Nam Ha	**NHA**	Louang Namtha
Nam Kading	**NKD**	Bolikhmxay
Nam Pouy[1]	**NPY**	Xaygnabouli
Nam Xam	**NXM**	Houa Phanh
Phou Dene Din	**PDD**	Phongsaly
Phou Hin Poun	**PHP**	Khammouane*
Phou Khao* Khoay	**PKK**	Bolikhamxay, Vientiane*, Vientiane Prefecture, Xaysomboun Special Zone
Phou Loey	**PLY**	Houa Phanh, Louang Prabang, Xieng Khoang
Phou Phanang	**PPN**	Vientiane, Vientiane Municipality
Phou Xang He	**PXH**	Savannakhet
Phou Xieng Thong	**PXT**	Salavanh, Champasak
Xe Bang Nouan	**XBN**	Salavanh, Savannakhet
Xe Pian	**XPN**	Champasak, Attapeu
Xe Xap	**XXP**	Salavanh, Xekong

[1] Some reports suggest that the portion of the NBCA containing the Nam Pouy river be excised and therefore the NBCA name changed, to 'Nam Poun'. However, local government agrees with neither the excision nor the name change. We suggest following their wishes and retaining the name 'Nam Pouy'.
* Spelling varies slightly from the standard system to accommodate long-standing convention.

Conflicting measurements and uncertain boundaries mean that the precise area of the NBCA system is not known. Table 3 compares NBCA sizes from three sources: Decree 164, revisions recommended by Berkmüller *et al*. (1995a) and the latest draft of the *Fact Sheets for National Biodiversity Conservation Areas in Lao PDR* (DFRC, in prep.). Based on the figures from Decree 164 and the *Fact Sheets* (Berkmüller *et al*. was not considered, since they made non-binding recommendations only) the probable range for the system's total area is 28,600 km^2 - 33,500 km^2, or 12 -14% of the nation's land area.

While the area under protection is substantial, all NBCAs are in reality multiple use areas: for agriculture, fishing, hydropower, commercial NTFP harvest and sometimes timber harvest. None are strict national parks as found in some other countries.

Table 3: NBCA sizes according to various sources.

	Decree 164	Berkmüller *et al*. 1995a	Draft *Fact Sheets*
DAP	2,000	1,975	1,699
DHS	1,100	9,10	947
DPV*	~	~	1,745-2,201
HNN	820	865	750
NET	1,700	1,915	2,144
NHA	690	445	1,118-2,224**
NKD	1,690	1,740	1,442
NNT	3,532	3,710	3,058***
NPY	1,912	1,150	1,516
NXM	700	580	651
PDD	2,200	1,310	1,592
PHP	1,500	1,580	2,029
PKK	2,000	1,390	1,608
PLY	1,500	1,465	1,302
PPN	700	0	580
PXH	1,099	1,060	993
PXT	1,200	995	879
XBN	1,500	1,260	1,084
XPN	2,400	2,665	2,173-3,418
XXP*	~	~	1,283-1,498

* These NBCAs were gazetted after Decree 164 and the publication of Berkmüller *et al*. (1995a).
** The figure of 2,224 is the size of NHA, with recent additions, according to Southammakhot (2000).
*** Does not include the area of two recently gazetted corridors between NNT and nearby NBCAs.

Once the NBCAs had been decreed (and even earlier), surveys and management initiatives accelerated through the 1990s. These were executed mostly by DoF in partnership with the provinces and districts, and assisted (financially and technically) by a variety of donors. This progress culminated in late 1999 when Lao PDR hosted the World Commission on Protected Areas 2nd Southeast Asia Regional Forum.

1.3 Social and Economic Context

1.3.1 Population density and trend

The Lao NBCA system has developed within one of Asia's least developed and least populated nations. The current population is about 5.2 million, and growing at about 2.8% per year (Southammakhot [sic] 2000). In 1995 average life expectancy was 51.7 years and infant mortality 93 per 1,000 live births (UNDP 1999). These statistics reflect a country with high population growth but also high rates of mortality. The projected population in 2020 is 7.7 million (MAF 1999).

1.3.2 Ethnic and cultural diversity

Lao PDR is ethnically highly diverse, not only in terms of the total number of ethno-linguistic groups, but also in the breadth of their higher linguistic classification. More than 230 languages have been identified in Laos, in four language superstocks: Tai-Kadai, Mon-Khmer (Austroasiatic), Hmong-Mien, and Tibeto-Burman (CARE 1995; State Planning Committee 2000a). By comparison, on the island of Borneo, which is about five times larger than Laos, just 65 languages are recognized and all belong to a single language superstock, Austronesian. Thus Laos, despite its small size, rates as a “megadiversity” country for ethnic and linguistic diversity.

Details on the ethnic diversity of Laos, and its relevance to biodiversity conservation, can be found in Annex 1, *Ethnic Landscape of Lao PDR and the NBCAs*.

1.3.3 Economics and development

Decades of war and instability ended with the establishment of the present socialist government in 1975. However, development progress was slow until the Fourth Party Congress in 1986, when a "New Economic Mechanism" was introduced. Economic liberalization and increased foreign investment followed, and for most of the 1990s the economy grew at 6-7% per year. The Asian economic downturn of 1997 depreciated the currency and stalled the economy. By 2001, however, the situation has improved and the currency has stabilized.

On a Human Development Index that combines *per capita* income, literacy and life expectancy, in 1999 Laos ranked 140th out of 174 countries in the world. Problems of health and illiteracy and are particularly acute among the rural population and among women (UNDP 1999). Nonetheless, per capita real GDP grew at an annual rate of 4.6 % between 1992/1993 and 1997/1998, until the onset of the Asian economic crisis. During the same period, the percentage of the poor in most of the country decreased between 2.1-3.6% (in Vientiane Municipality the decrease was almost 14%). (State Planning Committee 2000a).

Agriculture is the dominant contributor to GDP, accounting for more than 50% of the total. Timber and hydropower exports account for two-thirds of foreign income earnings (Badenboch 1999).

Helping its population meet basic food sufficiency is an over-riding concern for the Government. Over the period 1980-1996, production *per capita* of staple food crops barely kept up with lower estimates of population growth (2.5%) and production *per capita* of wet rice actually declined (MAF 1999). Since then the trend has been more promising as the economy becomes increasingly diversified and market driven. However, development is concentrated in the Mekong lowlands and the gap in living standards between the lowlands and the uplands is widening (MAF 1999).

1.3.4 Land use

While population density in Lao PDR is a relatively low 20 people/km^2 it has been observed that, while there may not be many people in Lao PDR, there are people everywhere in Lao PDR. The small amount of arable land is dispersed throughout the country, and thus the population is, too. About 80% of the population of Laos lead a mixed life of subsistence agriculture and collection of natural resources for food, medicines, trade goods, and construction materials. This lifestyle is possible in large part because, as a consequence of its low population density, Laos retains relatively rich forest cover. Recent assessments put the figure at about 40% of the land area (Baltzer *et al.* in prep.), but only about 17% of the land area is believed to be under original forest (MacKinnon 1997).

Laos's rich biological and cultural diversity have given rise to a diversity of agroecosystems. For example, 13,600 genetic varieties of rice have been identified in the country. This is second in the world only to India, a country with 14 times the area as Laos and 200 times as many people (IRRI, cited by State Planning Committee 2000b).

The diversity of landscapes and cultures in Laos mean that the interactions of traditional livelihoods with natural resources varies widely. Pioneering, destructive agricultural practices are more common in the mountainous north, where Hmong-Mien groups are common. The only provinces in Laos without NBCAs (because insufficient natural habitat remains) are in the far north: Bokeo, Louang Prabang (although a part of one NBCA stretches into the province) Oudomxay, and Xieng Khoang (but also has a small part of one NBCA). In contrast, sedentary Mon-Khmer groups, who practice long fallow, rotational swiddens, dominate in the uplands of the central and southern provinces. These provinces retain areas of good forest cover and consequently all have NBCAs, most more than one. Annex 1 compares in more detail the traditional agricultural systems of Laos.

Lowland Tai-Kadai, the major ethnic group of Lao PDR, have settled along the Mekong and its plain. They are sedentary cultivators of paddy, an agricultural system that keeps the landscape under permanent agriculture, with no opportunity for forest regeneration. They are also better connected to external markets, and therefore to incentives and technology to expand agriculture

beyond that needed for subsistence. As a consequence, little natural habitat remains in the Mekong Plain, and NBCAs, with few exceptions, are in upland areas.

Lao PDR's s geographic position in the center of neighbors with more than 10 times its population but markedly less relative forest cover and hydropower potential (Thailand, Vietnam and Yunnan, China) has put pressure on the resources of Laos far and above that which would be generated by its own population. For example, most new hydropower development in Laos is for export.

2 CURRENT STATUS

2.1 LEGAL FRAMEWORK

2.1.1 National instruments

Prime Minister's Decree 164
PM Decree 164 established the NBCA system in 1993. It named and mapped (at 1:500 000 scale) 18 *Pa Sa-nguan Heng Sat*, or "National Conservation Forests'. To distinguish these areas from other potential types of 'conservation forest' the term “National Biodiversity Conservation Area” was adopted for English usage (Berkmüller *et al.* 1995a). The term also more accurately reflects government intent for these areas according to the wording of the Decree. According to the Decree, the areas (and the two added later to the system) have three objectives:

(i) protection of forests, wildlife and water
(iii) maintenance of natural abundance and environmental stability
(iii) protection of natural beauty for leisure and research

The Decree places prohibitions on the following activities in the NBCAs:

- cutting and removal of any of timber except for research purposes;
- hunting, fishing or NTFP collection without specific authorization each time from MAF/DoF;
- mining, and construction of reservoirs or roads without GoL permission.

NBCAs are the only managed, national-level areas devoted to nature conservation. At this time, there are no separate national parks, national wildlife sanctuaries, or similar areas.

Forestry Law (1996)
The Forestry Law attempted to define in more detail the legal status of all forests in Laos. It made the NBCAs (or "National Conservation Forests") one of five legally defined forest types in Laos. The other four are “Protection”, “Production”, “Regeneration” and “Degraded” Forests. [Note: The Forestry Law defines the role of "Protection Forests" as watershed protection, erosion control, national security and prevention of natural disasters. They are more or less unmanaged and vaguely defined areas in steep terrain along international borders. For example, the whole of the Vietnam border area not in an NBCA is said to be "Protection Forest" (DFRC staff, pers. comm.). Their potential contribution to biodiversity conservation is little understood].

English translations of the Forestry Law define "Conservation Forests" as follows:

Article 18: Conservation Forest is forest and forest land set aside for the purposes of conservation of fauna, flora, nature, and various things of historical, cultural, touristic and environmental value and for scientific study and research.

It should be noted that Conservation Forest can be designated at the village, district, provincial

and national level. NBCAs are the *national*-level Conservation Forests.

The Law also provides for zonation within NBCAs:

Article 42: Preservation of Conservation Forest:
In order to maintain the richness as well as to preserve the flora and fauna species and biodiversity to self-maintain and reproduce, and at the same time to make available forest with natural, aesthetic scenery for developing national parks appropriate for tourism and scientific research, it is necessary to preserve conservation forest which is divided into 'absolutely prohibited zone', 'management zone' and 'linking zone'.

- *Absolutely Prohibited Zones* are defined by the Law as areas where no extractive use is allowed, and entry will be by permission only. This corresponds to what is more commonly called in English a "Totally Protected Zone" (TPZ).

- *Management Zones* are defined as areas contiguous with TPZs, but where limited and regulated extractive use is allowed by "the people". This corresponds to the more common term "Controlled Use Zone" (CUZ).

- *Linking Zones* connect protected areas to one another or to other types of forest, for the enhancement of wildlife conservation. No hunting, tree cutting or other damaging activities are allowed. They correspond to "corridors."

Application of the Forestry Law will be clarified in by sets of implementing regulations. In March 2001 DoF/DFRC completed a draft of regulations for protected areas and wildlife. It has been submitted to MAF for comment and approval. Because the review and approval process is not completed, detailed description of the regulations is neither appropriate nor possible at this time. When the implementing regulations are complete, the Forestry Law will apparently supersede Decree 164 (Sawathvong 2000).

Land Law (1997)
The Land Law provides for allocation of land to individuals, families and organizations. While the user is guaranteed certain rights (e.g., rights of use, transfer, inheritance), the land can be used only according to land use plans issued from various levels of government. This should provide additional legal basis for defining limits to land use in NBCAs.

A more detailed examination of the NBCA legal framework is presented in Annex 2.

2.1.2 International agreements

UN Convention on the Protection of Biological Diversity (CBD):
GoL ratified the CBD on August 22, 1996. The key obligations of the CBD for Lao PDR relevant to NBCAs are found in Article 8, on *in-situ* conservation. They include:

(a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;

(e) Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas;

(i) Endeavour to provide the conditions needed for compatibility between present uses and the conservation of biological diversity and the sustainable use of its components;

(j) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and

encourage the equitable sharing of the benefits arising from the utilisation of such knowledge, innovations and practices;

This last provision is consistent with GoL's policy to promote local participation in the management of the NBCAs. Other parts of the convention require parties to produce a National Biodiversity Strategy and Action Plan, which outlines policies, programmes and plans for the conservation and sustainable use of biological diversity. MAF and STEA are currently cooperating on producing such a document.

World Heritage Convention

The WHC (1972) is operated under the auspices of UNESCO. It provides recognition to sites of "outstanding universal value", whether from a natural or cultural perspective, or both. WH status can thus act as an international overlay of recognition to any category of domestic protected area, providing – of course - it meets the strict criteria for assessment. Initial assessment and subsequent monitoring of natural qualities of WH heritage sites is undertaken by IUCN under terms of the convention itself and through a contract from UNESCO. GoL ratified this Convention in 1995, but has yet to nominate an NBCA under the natural heritage list.

Under the cultural heritage list, which is maintained separately, the former royal capital of Louang Prabang in central Lao PDR was awarded World Heritage status in 1998. GoL is waiting to analyze this experience before deciding whether or not to proceed with the nomination of additional WH sites, such as one or more NBCAs.

ASEAN Membership

Laos became a member of the Association of Southeast Asian Nations in 1997. The principal legal instrument of ASEAN that has potential nature conservation obligations for Laos is the Agreement on the Conservation of Nature and Natural Resources. However, it has been ratified by only three member countries since it was adopted in 1985, and therefore is not in force and is unlikely to have implications for NBCAs anytime soon.

ASEAN has a provision for the establishment of ASEAN Heritage Parks and Reserves. These can be likened to a regional variety of World Heritage Sites (although the two are not officially related). Nominating one or more appropriate NBCAs as an ASEAN Heritage site could be a less-daunting alternative to nomination for World Heritage status. Or it could be used as a 'trial' step towards WH status.

ASEAN also has provisions to assist member countries to establish transboundary nature reserves.

Framework Convention on Climate Change

Lao ratified the Framework in 1996. It allows for investment in activities, such as forest conservation and regeneration, that mitigate the effects of rising levels of greenhouse gases. The Clean Development Mechanism allows industrialized nations to offset their carbon emissions by investing in the conservation of tropical forests. This could be used by Laos as a means to help fund protection of the NBCAs.

Others

Lao PDR is not a party to the Ramsar Convention on Wetlands of International Importance or the Convention on International Trade in Endangered Species of Flora and Fauna (CITES). Accession to Ramsar could facilitate long-term financial support of an important wetland area, such as Xe Pian (XPN).

It has been recommended in numerous reports that Lao PDR become a signatory to CITES as soon as possible. However, the cost/benefits to Laos should be carefully examined before a decision is made, especially in light of the small administrative capacity of Laos (Nash and Broad 1993). Accession to CITES will probably have little impact on transborder wildlife trade in Laos.

Most of the trade goes around, not through, border checkpoints (Nooren and Claridge 2001). Furthermore, since Laos's neighbors are CITES signatories, transborder movement of threatened wildlife from Laos is already banned under CITES. Lao PDR should join CITES sometime, the question is when. At present, accession to the agreement may only add to the already heavy administrative burden of the small DFRC staff, distracting them from more pressing priorities, in exchange for little conservation benefit.

2.2 POLICY FRAMEWORK

2.2.1 Objectives of the NBCA system

Policy can be stated in writing, words or action. These sources taken together, GoL has identified these objectives for the NBCAs:

- ***Biodiversity conservation***
  Long-term biodiversity conservation is the primary objective of the NBCAs according to PM Decree 164 and the 1996 Forestry Law.

- ***Maintenance of ecological stability***
  This is the second stated objective of the NBCAs, according to PM Decree 164.

  A secondary reason cited for GoL's selection of Phou Phanang as an NBCA is its proximity to Vientiane. Being close to the capital, it was felt its forest could contribute to air quality and climate stability in the city (DFRC staff, pers. comm.)

- ***Protection of scenic beauty for leisure and research***
  This is the third and last objective stated in PM Decree 164. The Forestry Law states these objectives in Articles 18 and 42. This has been interpreted in part as ecotourism.

- ***Protection of large, natural areas that have cultural significance***
  The Forestry Law (Art. 18) mentions conservation of historical or cultural values as a role for NBCAs. This objective was also expressed by the addition of Phou Phanang NBCA to the system, an area of limited biogeographic value, but significant historical interest. Similar reasons contributed in part to the addition of Dong Phou Vieng (DPV) to the NBCA system.

- ***Watershed Protection***
  According to the Forestry Law this is principally the role of Protection Forest, but watershed protection is often stressed often by MAF and DoF policy makers as one of the most important objectives of the NBCAs. Watershed protection is considered vital for the long-term viability of the development of hydropower and lowland agriculture.

In addition to these objectives, GoL policy sees three main auxiliary *roles* some NBCAs can play in national development: contribution to rural livelihoods, hydropower development, national security. These are discussed in Section 2.5, *Economic Benefits of NBCAs.*

2.2.2 Relationship to IUCN PA categories

In view of the above 'multi-use' objectives and roles of the NBCAs, GoL feels that most NBCAs at present are closest to IUCN Category VI Protected Areas: Managed Resource Areas (IUCN 1994, Southammakhot 2000). Some could be probably managed as Category II: National Park. This will depend on at least two factors:

- Evolving GoL policy, to be clarified in the coming NBCA regulations;
- An assessment of the suitability of potential sites, especially in light of the provision that they contain "ecosystems not materially altered by current human occupation or exploitation."

2.2.3 Management policy

Although (or because?) large national protected areas quite new to Laos, in significant ways the Lao approach to protected area management is more advanced than other 'more developed'

Asian nations. This stems from three progressive GoL policies that influence all NBCA management in Laos:

- *Management should benefit NBCA residents*
  Clear GoL policy is that NBCA management should not take a confrontational approach with residents of NBCAs, but instead should encourage local support for the areas. Rather than move people out of NBCAs, GoL intends to send assistance in. The goal is to help them use the NBCA resources in a sustainable manner, which should also build local support for the areas. This policy should help to avoid the sort of heated conflicts between local people and national parks that have occurred in other Asian nations.

  While GoL recognizes that residents of NBCAs cannot hope to reach the same material prosperity as residents of towns or agriculture development zones, management of the NBCA should result in a net benefit to them. Consequently, GoL has indicated a clear preference for the Integrated Conservation and Development (ICAD) management model.

- *Management should proceed in collaboration with local residents.* GoL's approach to NBCA management emphasizes a participatory, non-confrontational approach (Southammakoth and Craig 2000b).

- *Delegation of management implementation to the local level* GoL has also taken a progressive policy to the structure of NBCA management. Management is not to be implemented from the top but, in keeping with the ICAD approach, is to be planned and implemented in a participatory manner with NBCA residents.

  To best achieve this, government involvement in management will be concentrated at the most local level, the district, through the District Agriculture and Forestry Offices (DAFOs). This is in contrast to more 'top-heavy' management structures in some neighboring countries, where power is held strongly in the central government, distant from the protected areas.

2.3 INSTITUTIONAL FRAMEWORK

2.3.1 General institutional structure

The management of most forests in Lao, including those designated as NBCAs, is the responsibility of the Ministry of Agriculture and Forestry (MAF). Responsibility for NBCAs flows from MAF down through its Department of Forestry (DoF), DoF's "Division of Forest Resources Conservation (DFRC)", to Provincial Agricultural and Forestry Offices (PAFOs) and then to District Agricultural and Forestry Offices (DAFOs). Finally, in a co-management approach, villagers are officially involved in NBCA management. Figure 2 summarizes the management hierarchy.

2.3.2 Central level

DFRC, a unit of DoF, is the national focal agency for the coordination of NBCA management. It was formed in 1999, but has had three predecessors within DoF in the past decade that were responsible for nature conservation and protected area management. The largest and most active was DFRC's immediate precursor (from 1994 to 1999), the Centre for Protected Areas and Watershed Management (CPAWM). In mid-1999, GoL undertook a wide-ranging reorganization to decrease the central bureaucracy, improve efficiency and move staff from Vientiane to assist provinces and districts in the field. As a consequence, CPAWM was abolished and partially replaced by DFRC.

The principal responsibilities of DFRC are to:

- develop and implement strategic plans for the conservation of NBCAs, wildlife and water;
- provide technical guidance down the vertical organization to the local level and undertake periodic inspection of conservation activities;

- disseminate laws and regulations related to conservation;
- study and provide opinions on conservation initiatives;
- coordinate with international organizations under DoF's guidance;

As can be seen, DFRC is principally a service organization, providing technical assistance to local levels, options and opinions to DoF, and coordination assistance to international organizations. Policy formulation occurs higher in government.

At this writing, DFRC has about 15 staff. The organization of the staff is still evolving, due to the newness of the organization. In general, however, it is divided into a technical unit and an admin unit. Technical staff have responsibility for coordinating the assistance of foreign conservation organizations (e.g., IUCN, WCS, WWF).

2.3.3 Local level

Long-standing GoL policy to delegate management authority for most national development to the local level was recently reiterated in Prime Minister's Advisory Note 01 (2000). NBCAs are generally staffed and managed by staff from the relevant Provincial Agriculture and Forestry Office (PAFO) and their DAFOs. The most common arrangement is for the NBCA Head to be assigned from the PAFO, and his core staff drawn from a mix of PAFO and DAFO staff. There are variations on this, but the preferred GoL model seems to be for most of the NBCA staff to be drawn from, and based in the districts. Part of the team might also be based at an NBCA field office. Field offices are now established in nine NBCAs.

An exception to the above arrangement is Phou Khao Khoay (PKK) NBCA, which is managed by the Ministry of Defence. Although PKK overlaps two provinces, Vientiane Prefecture and Xaysomboun Zone, and a total of seven districts, the provinces and districts have little involvement in management. Instead, the army manages the area through six substations and deals directly with villages on most issues. The current Head of the NBCA, however, is an experienced NBCA manager seconded from DoF to the military (where he holds the rank of Captain).

The military also has a major presence in Nam Pouy (NPY) and Phou Xieng Thong (PXT), for border security.

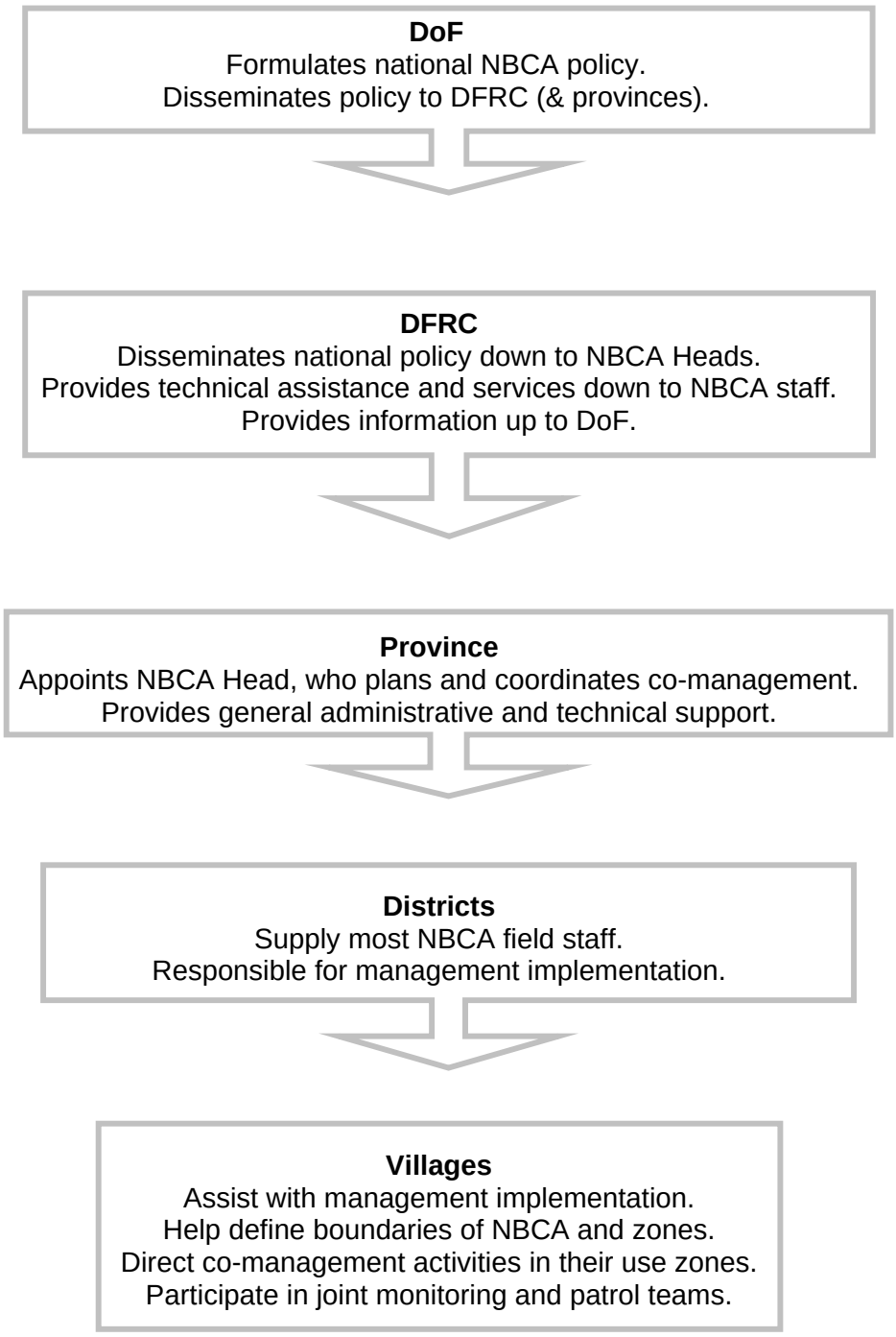
Staff levels vary widely among the provinces. However, this is not always reflected in the number of staff assigned to an NBCA. For example, Phongsaly Province in northern Laos has fewer than 10 PAFO staff, and none assigned to the province's one NBCA, Phou Dendin. Attapeu, a slightly smaller province in the south, has more than 60 PAFO staff but, likewise, none assigned full-time to its Dong Ampham NBCA.

The village, through its chief (elected by the villagers from candidates approved by the district), is part of the civil administration. The responsibilities and rights of villages in regards to NBCAs are evolving through two processes: the development of a Land Law, with its integral process of land allocation; and the development of participatory management in the NBCAs as guided by the Forestry Law. Cooperation of village chiefs is critical for the success of participatory management.

2.3.4 Other GoL agencies

Several other GoL agencies outside of MAF contribute to NBCA management (DoF 2000). For example, the Science, Technology and Environment Agency (STEA) in the Office of the Prime Minister is the national focal point for GEF projects, it recently completed a draft of a *National Environmental Action Plan*, and it will take the lead role in the coming preparation of a Biodiversity Strategy and Action Plan for Lao PDR. Mass organizations such as the Lao Women's Union play a role in local management of some NBCAs. Finally, agencies such as the Hydropower Office of the Ministry of Industry and Handicrafts and the National Tourism Authority are involved in development projects in or near NBCAs. A discussion of the role of these and other agencies in NBCA management are presented in Annex 3.

Figure 2: **NBCA management structure.**
Adapted from Southammakoth and Craig (2000a).



2.4 BIODIVERSITY SIGNIFICANCE OF THE NBCA SYSTEM

2.4.1 Habitats and ecosystems

The high international conservation significance of forests and other habitats in Laos has often been noted generally (e.g., MacKinnon and MacKinnon 1986, Berkmüller *et al.* 1995b, Duckworth *et al.* 1999). A more specific assessment has been made through the analysis of *ecoregions*, contiguous habitats or ecosystems of a identifiable type. WWF compiled a global priority list of the ecoregions of highest significance in the world for biodiversity conservation, "The Global 200" (Olson and Dinerstein 1998). Four of these occur in Laos and its NBCAs:

- Annamite Range Moist Forests
- Indochina Dry Forests
- Northern Indochina Sub-tropical Moist Forests
- Mekong River and its catchment.

Contiguous and biogeographically similar ecoregions can be conceived as one *ecoregion complex*. WWF recently coordinated the identification and assessment of a complex covering central and southern Laos, central and southern Vietnam, and Cambodia. This has been termed the "Forests of the Lower Mekong Ecoregion Complex" (FLMEC) and a detailed analysis of its biological significance is about to be published (Baltzer *et al.* in prep).

These ecoregion analyses, combined with the analyses of MacKinnon and MacKinnon (1986) and MacKinnon (1997), identify the following habitats in Laos of high international significance for conservation:

- **Evergreen Forests of the Annamite Mountains and foothills**. This is considered the most biologically distinct ecosystem with the FLMEC. Species endemism is high for many taxa. Included are extremely wet forests, formed by a interaction of monsoon patterns and local topography. Annamite forests are found only in Laos, Vietnam, and Cambodia, but they are probably of highest quality in Laos, due in part to lower human pressure. The Annamites proper are represented in Nakai-Nam Theun (NNT), Xe Xap (XXP) and Dong Ampham (DAP) NBCAs (although the biological communities in each are quite different). Foothills are represented in NBCAs such as Nam Kading (NKD). Box 1 describes features of the Annamite Range that make it so important.

- **Central Indochina Limestone Karst**: Like the Annamites, species endemism is high and the habitat is found elsewhere only in Vietnam. It is represented in Laos in Phou Hin Poun (PHP) and Hin Nam No (HNN) NBCAs.

- **Dry Dipterocarp Forests of the Mekong Plain**. Found mainly in southern Laos, and characterized by relatively flat, low elevation land with grass and herbs under widely spaced deciduous trees (predominantly Dipterocarpaceae). It is typically studded by permanent or seasonal pools, which are of high importance for a variety of wildlife, from large ungulates to rare waterbirds. This habitat is best represented in XPN NBCA.

- **Bolavens Plateau.** This massif between the Mekong and the Annamites in southern Laos is a habitat of high distinctiveness in the FLMEC. It occurs only in Laos, and part of it is protected in only one gazetted NBCA, Dong Houa Sao (DHS).

- **Northern Highlands.** The mountains of the north are biogeographically distinct from the Annamites in the central and southern part of the country, with different species assemblages. While they have received less attention than the Annamites, they are nonetheless an important habitat type. Representations occur in northern NBCAs such as Nam Ha (NHA), Phou Dene Din (PDD), Nam Et (NET) and Phou Loey (PLY).

- **Mekong River**. Laos has a pivotal role in the conservation of the biodiversity of the Mekong. Not only does much of the river run through Laos and along its border, more of the drainage that feeds the river is found in Laos than any other country. Laos is much more important to the river's conservation than the country with which it shares the Mekong as a border, Thailand. A boundary of one NBCA (PXT) is formed by the Mekong, but the river is not a focus of management (probably in part because it forms the international border with Thailand).

- **Other rivers and streams**. Because of the extensive mountainous topography of Laos, streams are a widespread and key habitat. The fish diversity in streams of Laos is very high, and so is endemism (Baird 1998, Baltzer *et al*. in prep). Many NBCAs, especially the mountainous ones, include important extents of natural streams. A highly threatened, distinct habitat type are larger, slow moving rivers, such as the Nam Theun/Nam Kading in central Laos and the Xe Kong and Xe Banhiang in southern Laos. Very limited unaltered stretches of these rivers flow through any NBCA.

2.4.2 Species diversity

The biodiversity of Laos is less well known than neighbors such as Vietnam, China and Thailand. The last major study of its botany was published more than 40 years ago (Vidal 1960). Systematic field investigation of birds and larger mammals began only in 1992; sporadic studies of bats and rodents commenced in 1994, and a survey of reptiles and amphibians in 1998. There have also been studies of fish diversity in the 1990s, building on some scattered work during the French colonial period and in the 1970s (I. Baird, pers. comm.) With the exception of fish and the early botanical studies, the vast majority of this survey work focused on NBCAs.

Despite incomplete information, it is clear that the Lao NBCA system is of significant, international importance to species conservation. For example, Hin Nam No NBCA is home to seven species of diurnal primates, all of global conservation concern (Timmins and Khounboline 1996, Duckworth *et al.* 1999, Walston and Vinton 1999). Nakai-Nam Theun NBCA harbors at least 430 species of birds (Timmins and Evans 1996, Tobias 1997). This represents:

- 1/25th of all bird species in the world
- more than half the bird species found in the entire FLMEC (which covers all of Cambodia and most of Vietnam and Laos).
- as high a bird diversity as any nature reserve in SE Asia.

With modern records of at least 13 species of diurnal primates, two canids, two bears, eight cats, two rhinos, two pigs, at least nine deer, six bovids, Asian Elephant, Irrawaddy Dolphin (and possibly *Pseudonovibos spriralis*, Long-tailed Goral, and Asian Tapir), Laos has amongst the very highest large mammal diversity of any Asian country or region of remotely comparable size. Certainly, its density of ungulate species is unmatched (about 20 species, and possibly close to 25). Most of these mammals are globally threatened, and some have amongst their largest remaining populations in Laos (Duckworth *et al*. 1999).

In the Indochinese Peninsula, despite limited survey work, 87 families of fish are known. In comparison, in all of Africa only 74 are known, and just 60 in South America (Kottelat 1989). Given the great diversity of freshwater habitats in Laos--the slow-moving Mekong River and its tributaries, with their alternating slow stretches and rapids; the many isolated montane streams --much of this fish diversity is concentrated in Laos.

Approximately one-third of the plants of the Indo-Chinese biogeographic sub-region are endemic to the sub-region, and most are found in Sub-unit 10, which covers most of Laos (MacKinnon and MacKinnon 1997).

Conservation International has designated the Indo-Burman region, which includes Laos, as one of the world's global biodiversity hotspots (Mittermeier *et al.* 1998).

BOX 1. THE ANNAMITE MOUNTAINS: JEWEL OF LAO BIODIVERSITY
Robert J. Timmins

The Annamite Mountains form a considerable part of the Lao-Vietnam border, and a natural divide between the Mekong lowlands and the Vietnamese coastal plain. Their north-south orientation has shaped the distributions of many animals and plants.

The Annamites have a crucial role to play in global biodiversity conservation, because they represent an area of high endemism. One of the world's most beautiful primates, the Douc Langur (*Pygathrix nemaeus*), is a good example. The conservation importance of some of the Annamite endemics is heightened by their extreme biological distinctiveness. That is, they have no close relatives in any other species. These include the Saola (*Pseudoryx nghetinhensis*) and a pine *Pinus krempfii*. There are also many near-endemics species, whose distributions stretch to limited areas away from the Annamites. A good example is Crested Argus (*Rheinardia ocellata*), a large pheasant whose tail feathers in the male are the longest feathers of any bird in the world (reaching nearly 2 m.). Crested Argus occurs in only two places in the world: the Annamites, and a few mountains in distant Malaysia.

The faunal and floral distributions of the Annamite Chain--its biogeography--is complex. Understanding these patterns is important for interpreting the contribution that individual parts of the mountain range make to global biodiversity conservation. One determinant of Annamite diversity appears to be related to climatic patterns. The Annamite range acts as a barrier to cloud movement, which has a particularly important effect during the winter months when rain-laden clouds of the northeast monsoon move across Vietnam westwards from the South China Sea. Meeting the Annamites, these clouds shed rain and generate fog on the eastern slope, but the high Annamite spine prevents the clouds from crossing over to the Lao side along much of the border. The Lao slopes are drier in the winter, and therefore the forest structure different. However, at lower elevations the winter clouds and rain spill through to the Lao side, augmenting the summer monsoon to produce distinctive 'everwet' forest. An example is the forest just north of Nakai-Nam Theun NBCA. Unfortunately, many of these localised wet forest areas are not yet included in the Lao NBCA system.

An interesting pattern is the diversity and peculiar distribution of some montane species (i.e. species usually found above 1000 m). Most montane species in the Annamites have a Himalayan affinity. However, the central Annamites (including areas of Savannakhet, Xekong and Attapu Provinces) and the southern Annamites (of which no part lies in Laos) have several endemic montane species not found in the northern part of the range. Examples are Black-browed Barwing *Actinodura sodangorum* and Black-hooded Laughingthrush *Garrulax milleti*. The Annamites are not contiguous, and there are several breaks from north to south, resulting in some disjunction between northern, central and southern reaches of the mountains. This has presumably resulted in the speciation of ancestral northern species into endemic forms in the isolated central and southern Annamite areas.

There are other patterns of curious species distributions in the Annamites, e.g., pairs of similar species meet and replace one another at north-south boundaries, but there is little consistency in the latitude of this 'replacement boundary' among these species pairs. Climatic fluctuations during and since the Pleistocene and the complex topography of the Annamites are probably the mechanisms that have generated this, and other, complex patterns.

Conservation of the Annamites and its unique biodiversity is solely in the hands of three countries: Laos, Vietnam and Cambodia. From the above patterns it is clear that conserving one area of the Annamites cannot conserve all its endemic species. The conservation challenge is made greater by the fact that large areas of forest have already been lost, particularly at low altitudes. The Lao NBCA system protects key areas of the Annamites, but gaps remain.

Using a combined total of plant, bird and mammal species, weighted for endemism and land area, MacKinnon (1997) ranks Laos moderately rich in species. Given the limited survey work in Laos (e.g., herpetological surveys began after the MacKinnon analysis was published), and

the fact that fish were not considered, this may underestimate the country's biological importance.

In the entire FMLEC 188 species of globally threatened birds and mammals are known, which is considered high for one region (Baltzer *et al.* in prep.). Most have been recorded in Laos and its NBCAs. And Laos is strategically important for the conservation of many. Elephants, for example, are reduced to a few dozen animals in Vietnam, but in Laos they are widespread in internationally significant numbers (Duckworth and Hedges 1998, Duckworth *et al.* 1999).

Neighboring Vietnam has justly received much attention for the recent descriptions of several new near-endemic mammals: Saola (*Pseudoryx nghetinhensis*), Large-antlered Muntjac (*Muntiacus vuquangensis*) and Annamite Muntjac (*Muntiacus truongsonensis*) among them. Yet, the populations of these animals are probably larger in Laos and therefore more critical to their global conservation. In addition, the survival of two other mammals recently rediscovered after a long absence of records, Roosevelts' Muntjac (*Muntiacus rooseveltorum*) and Heude's Pig (*Sus bucculentus*), may hinge on their populations in Laos.

While few plant and animal species are confined solely to Laos, many others besides the new mammals are shared with Vietnam only, and nowhere else. This is especially true of species associated with the Annamites. Given the much higher population pressure and the lower remaining forest cover in Vietnam, it is probable that if these species are not conserved in Laos, they face high risk of global extinction. And given the increasing pressures on the land, to be conserved in Laos, they must be conserved in the NBCAs.

2.4.3 Human cultural diversity

As noted in earlier sections, the cultural and linguistic diversity of Laos is extraordinarily rich. Because this diversity is greatest in remoter uplands, much of it is concentrated in the NBCAs. For example, 28 languages have been identified in NNT NBCA (J. Chamberlain, pers. comm.). This is more than 12% of Laos's known linguistic diversity, in just 1.5% of the nation's land area.

A seldom acknowledged, but potentially significant, role for NBCAs is conservation of this cultural heritage and diversity of Lao PDR. For example, five of the languages in NNT, and the ethnic groups who speak them, were only discovered by ethnographers in 1996 (CARE 1996, Chamberlain 1997). All are highly endangered peoples whose traditional livelihoods were based in the forest. Two of the groups now number fewer than twenty survivors. If they are to survive at all, conservation of the forests on which they depend for material, emotional and spiritual sustenance is critical.

Some view indigenous peoples as potential guardians of biodiversity and protected areas, because their livelihood systems have evolved to maintain the biodiversity on which they depend. Others view protected areas as guardians of indigenous peoples, shielding the resources on which they depend from overexploitation by outsiders. A third view, which maintains that the two cannot be separated, is presented in the context of the Lao NBCAs in Box 2.

BOX 2. BIOCULTURAL DIVERSITY AND LAO NBCAS
James R. Chamberlain

Most human inhabitants who were residing in areas which became designated as NBCAs are either swidden cultivators or in some rare cases such as Nakai-Nam Theun, or Hin Nam No, hunter-gatherers. The ethnolinguistic groups themselves are highly diverse, in fact a better term might be "National Bio-cultural Diversity Conservation Area" as there is always a human component to diversity. Culturally, The Lao PDR is one of the most complex countries in the world, with over 230 languages belonging to four ethnolinguistic families. All four families are represented in the NBCAs, and probably more than half the languages, including those most endangered. The relationship between these diverse peoples and the forest environment is intimate and unique for each group.

This relationship depends upon what has been called 'ritual technology' in swidden systems to describe the inseparability of cosmology and agriculture. It is not simply the environmental and technical capacity of the particular ethnic group that shapes its interaction with the forest. Rather, the total array of symbolic and conceptual forms by means of which a culture structures its relationship with nature is the minimal unit of conservation. When the ritual technology bond is severed pathologies emerge which will most likely be destructive of both humans and forest.

For example, the Khmou cannot clear a field if a muntjac is heard to call because this is the spiritual voice of the forest. When a field is cleared it is only with the combined efforts of forest spirits, ancestral spirits and the clan-based swidden group working together to affect the cleanest burn possible. But if there are no muntjacs who is to say what the effects might be. In this more or less homeostatic system, purposive destruction of the forest and wildlife cannot occur since it is innately maladaptive and without survival value.

Preservation of cultures and cultural diversity is implicit in the conservation of biodiversity. But as with any ecological system, or like the example of ritual technology, the object of conservation can only be biocultural wholes.

Preserving endangered cultures who reside in NBCAs is therefore analogous to preserving endangered species. Cultural systems are as important to NBCA ecosystems as flora and fauna. In this light the NBCA network has the potential to play an important role in the protection of endangered peoples and in asserting and reinforcing the interdependent relationship between nature and culture.

A fuller treatment of the unique biodiversity attributes of Laos and their geological and climatic antecedents can be found in Annex 4, *Ecological Overview of Laos.* A summary of the recent history that has shaped this biodiversity and its study is presented in Annex 5, *Historical Perspective on Biodiversity in Laos.*

2.5 ECONOMIC BENEFITS OF NBCAS

2.5.1 Potential development roles of NBCAs

GoL policy has identified several roles or contributions the NBCAs can make to national development:

Sustainable rural livelihoods

According to DoF, *"Development in NBCAs does not refer to large projects such as roads, dams resorts, etc. Rather it should emphasise livelihood improvement for local people..."* (LSFP and DoF 2000).

Natural resources in all NBCAs are used by local Lao citizens. Some indigenous groups have probably resided in areas now contained within an NBCA for at least two thousand years (J. Chamberlain pers. comm.). Current use of natural resources by NBCA residents may be sustainable in many cases, and the degree to which this true is varies with ethnicity, population

density, local geography, market access, effectiveness of the land allocation process, the effects of resettlement during the instability of the 1960s and 70s, and the type resource in question. It is clear that some resource extraction in several NBCAs is probably not sustainable today. This endangers both the long-term welfare of these communities and the biodiversity of the protected area.

While the prime objectives of the NBCAs are biodiversity and habitat conservation, GoL sees as both a benefit of NBCAs, and a tool for their management, assistance to make rural livelihoods sustainable in areas in or near protected areas. GoL considers poverty alleviation and forest conservation through improved agriculture and income generation as critical steps.

Hydropower development
Most NBCAs are located in steep topography, and several encompass plateaux. These are also desirable sites for hydropower development. GoL sees the possibility for some NBCAs and hydropower projects to support one another: use of part of an NBCA for hydropower, in exchange for some of dam revenues being applied to conservation of the rest of the NBCA.

This policy is demonstrated by the completed or proposed construction of hydropower projects which lie, or have significant affects (e.g., reservoir flooding) within the original boundaries of 8 or 9 NBCAs (40-45% of the system) (Hydropower Office map).

Ecotourism
Ecotourism can be viewed in two ways:

- as a *purpose* of NBCAs; i.e., one reason to maintain NBCAs is to generate considerable tourist income for the national economy; or:
- as an *aid* to NBCA management; i.e., smaller scale ecotourism is seen mainly as a way to fund and maintain the NBCA.

Under the first scenario, NBCAs are maintained (in part) for ecotourism; under the second, ecotourism is fostered for the NBCAs. DoF policy at the present time is closer to the second option. Ecotourism is viewed principally as way to generate funding and local support for *some* NBCAs, and its expansion should proceed cautiously. This can be considered the first step in a broader process whereby the ecotourism eventually makes a significant contribution to the national income.

National Security
This objective is expressed in the significant contribution the Ministry of Defence makes to the management of three NBCAs near international borders, PKK, PXT and NPY.

The national security role of an NBCA can be mixed benefit for the area. On one hand, it can attract considerable resources for management, especially manpower (in the form of soldiers) for patrolling against incursions, including poachers. PKK NBCA is a good example--it has by far the largest patrolling staff of any NBCA, all soldiers. On the other hand, to enhance security of the area, activities inconsistent with biodiversity conservation sometimes occur, e.g., road construction, the establishment of new villages, and restrictions on NBCA staff entering the area. These have occurred in NPY and PXT NBCAs (IUCN 2001). There is also the considerable risk of armed soldiers based in the areas hunting for food. This is occurs, for example, in NPY (Nam Pouy NBCA staff, pers. comm.).

2.5.2 Local economies
Each day, the majority of the rural Lao population eats something the family has harvested from a local stream or forest. For the poorest families, wild foods form the majority of their non-rice diet (State Planning Committee 2000b). Major components are fish, bamboo shoots, greens, wild tubers, and invertebrates such as snails and insect larvae. Many rural poor report that virtually all of their protein comes from wild sources (domestic animals are saved for ceremonial purposes and as repositories of wealth), and this dependence is greatest among indigenous

people in southern Laos, where NBCAs are concentrated (Chamberlain, in prep.).

Furthermore, since few rural households have surplus rice, vegetables or livestock to sell, much of their annual cash/trade income is derived from the sale of natural resources found in streams and forests. Clearly then, conserving the biodiversity of Laos also conserves the tenuous economic security of its most vulnerable people.

The value of non-timber forest products (NTFPs) consumed annually by the average rural Lao family has been estimated at US$280 (in a country where the average per capita income is less than $400). This is $224 million nationwide per year, 20% of GNP (Foppes and Ketphanh 2000). The total is far higher with two adjustments: if cash-income value of NTFPs were added, and if wildlife was considered an NTFP (which is justified ecologically and economically). It is important to note that the $280 annual figure is an average or *all* rural families, including those living in areas where little forest remains. The figure for residents of the more than 1,000 villages in or near the rich forests of the NBCAs must be far higher (J. Foppes, IUCN/NAFRI NTFP Project, pers. comm.)

The challenge is to boost the national economy through the sustainable use of timber and hydropower, while ensuring that this does not excessively damage the natural resource base on which so many rural economies depend. NBCA conservation can play a significant role in this effort.

2.5.3 National economy

> ***"[C]ountries are often reluctant to devote large amounts of land and financial resources to protected areas because the areas do not provide the revenues or taxes associated with using forests for timber extraction. With the exception of tourism, most of the benefits arising from protection do not result in cash flows that governments or conservationists can point to as justifying the protection activities; the benefits of protection are usually less tangible than a truckload of logs or rattan. For example, one set of outputs from the forests-environmental services such as climate regulation or watershed protection-are nonmarket public goods that provide benefits at the regional or national level. Even in countries where these environmental services are recognized as important, their economic values are generally not measured or given the same importance as timber revenues. Nevertheless, as improved ecological and economic information becomes available about these benefits, governments may be more willing to devote resources to protected areas to generate environmental benefits for their citizens."*** **(Kramer and Sharma 1997).**

The general economic benefits of protected areas have been widely discussed and studied (Phillips 1998). A detailed assessment of their value to the nation as a whole is probably overdue, and an analysis based on Total Economic Value should be a priority component of the coming Biodiversity Action Plan.

The most prominent tangible benefits (contributions to hydropower and ecotourism) were discussed in Section 2.5.1. Table 4 summarizes these and other economic benefits, and the level at which they are most likely to be perceived.

Laos need only look across its borders to see the national economic benefits of forest conservation. Just across the Mekong lies Isan, the northeastern region of Thailand. It is ethnically Lao--Isan and Laos share a common language, and in the past were often part of the same state. Like Laos, Isan is predominantly rural, populated mostly by small rice farming communities. Isan is widely recognized as the most impoverished region of Thailand, and consequently is often a center of social unrest. One factor in the region's poverty is the near-total deforestation of the area. This has had profound effects on water quality, soil fertility and therefore agricultural production.

To the north, Laos's neighbor China has recently instituted a logging ban in parts of the country in response to the disastrous floods of the Yangtze River. This is a profound lesson for Laos, with so much of its land area crossed by rivers and streams in steep, forested catchments. Ironically, the logging ban in China will increase pressure on the forested watersheds of Laos, and make it harder for Laos to adopt the 'lesson learned' and follow a wiser path.

Table 4. Economic benefits of NBCAs.

Benefits are rated small, medium or large (*** **** or *******) at local, national and global levels. **0** indicates benefits rated neutral or negative (i.e., a cost).

BENEFIT	DESCRIPTION	EXAMPLES	LEVEL AT WHICH BENEFIT PERCEIVED			
			Village	Province	Nation	World
Protection and utilization of species	Protection of plants & animals used without killing	elephants, resin trees, bamboo shoots	***	**	**	**
	Protection of species used after killing	All hunted animals, many NTFPs	*/**	**	**	**
	Opportunities for improved breeding (higher yields or pest resistance etc.)	Teak, hybridization of domestic and wild cattle	*	*	**	***
	Retain opportunities for new uses or added economic value from species	New medicines	*	*	**	***
	Maintain web of species relationships, thus preventing “knock-on” extinctions	Pollinators, and animals that disperse tree seeds	**	*	**	***
Ecosystem services	Regulation of water supplies	Minimize drought/ and floods	***	***	***	*
	Protection of soils	Prevent erosion and siltation	***	***	**	*
	Regulate local climate	PPN-Vientiane	**	**	*	0/*
	Regulate atmospheric composition	Fix CO_2 in vegetation, thus limiting climate change	0/*	*	**	***
Other development opportunities	Ecotourism	NHA, PKK	***	***	***	*
	Sustainable timber harvest	Industrial model/ Village forestry model	0/***	**/**	***/*	*/*
	Hydropower	Nam Leuk, NT2	0	**	***	0/*
	Education and research	PPN, PKK	*	**	**	**

2.6 PRESSURES ON NBCAS

2.6.1 Human population growth and immigration

The magnitude of all pressures on NBCAs will increase as human population increases, especially the population inside and around an NBCA. Population growth rates of rural communities within some NBCAs is known to be high. Sustainable livelihoods of residents, particularly sustainable agricultural systems, is an important management goal for NBCAs, but no agricultural system can be made sustainable for a perpetually increasing population. Therefore, population growth is not just an issue of biodiversity conservation, but also of the well-being of rural people. According to a recent GoL study, the rural poor commonly cite "too many children" as one cause of their poverty (State Planning Committee 2000a).

Immigration toward the rich forests of the NBCAs by people from resource-degraded areas is also a major threat to several NBCAs (e.g., Nam Pouy). The damage that results is not just a consequence of more people, but also that new immigrants generally use forest resources less sustainably than traditional, long-term residents.

> ***"In the Namtha district, 25 villages and settlements are within the area indicated as [Nam Ha] NBCA. Most of the villages are new and have followed the roads made by logging companies or the...roads between the districts. Some of the villages are old and have big areas. They are able to have a sustainable way of shifting cultivation. New villages are more destructive to the environment."*** **(Dobbelsteijn 2000).**

2.6.2 Habitat degradation activities

Baker *et al.* (2000) group the pressures on biodiversity in Indochina into two broad classes, "Habitat Degradation Activities", and "Resource Exploitation Activities". The most significant of the former in the Lao context are (not necessarily in order of magnitude):

Unsustainable agricultural practices

Both subsistence and cash-crop agriculture place pressure on NBCAs to varying degrees.

Because most NBCAs are in upland areas, swidden cultivation may be more of a threat than the conversion of habitat to paddies. However, the ongoing impact of swidden cultivation on forest loss has perhaps been exaggerated. A recent GoL study concluded that unregulated logging and encroachment by lowlanders into the uplands is probably a more serious problem. Between 1982 and 1992, for example, the area in Lao under shifting cultivation increased by only 5%, while the area of permanent cultivation increased 20% (cited in Badenboch 1999).

The extent of the problem varies widely from NBCA to NBCA. An obvious determinant is population size. Another is the ethnicity of the cultivators and their particular systems of planting and rotation. Northern Hmong-Mien groups are often pioneering cultivators, wearing out the land on one mountain then moving on to another. There may be little forest left anywhere within a couple hours walk of a twenty-year old Hmong village, with little prospect of regeneration due to establishment of *Imperata* grasses. Lowland paddy-cultivators who expand into upland areas (due to population pressure, for example), but lack experience in sustainable techniques of upland cultivation, can have similar consequences.

Other groups (such as Mon-Khmer), practice long fallow rotation systems. Some authorities believe that such a system is one of the few ecologically sustainable forms of agriculture in the forested tropics (Kathirithamby-Wells 1998). Paddies, for example, permanently destroy forest, and require high inputs of energy, e.g., fertilizer. In contrast to the Hmong scenario, forest can be found at the edge of a 100 year-old Sek village (Robichaud and Stuart 1999). For more detail on the relationship between agricultural practices and ethnicity in Laos, see Annex 1.

The extent that cash crop agriculture poses a threat is largely affected by the access of the NBCA to markets. Dong Houa Sao has a tremendous problem with the destruction of its forests

for the cultivation of coffee (by both insiders and outsiders) in large part because a road borders much of the NBCA (Dong Houa Sao NBCA staff, pers. comm.)

Lastly, the ecological/topographical characteristic the NBCA determines the extent of agricultural pressure. Limestone areas like Hin Nam No have limited potential for agriculture of any kind, while the altitude and topography of Dong Houa Sao make it highly suitable for coffee.

Livestock grazing

In the Lao dry season, villages often turn large livestock (cattle and water buffalo) loose in the forest. Livestock grazing can threaten the biodiversity of NBCAs in at least four ways:

1. Villagers burn the understorey of forests to promote the growth of grass for grazing.
2. Livestock affect forest structure, particularly by consuming and suppressing seedling trees. However, there is some evidence from northern Laos that livestock grazing might promote forest regeneration under some conditions (C. Flint, IUCN, pers. comm.)
3. Villagers often defend their livestock by killing large predators, such as Tigers.
4. There is the potential for transmission of disease from domestic livestock to wild ungulates, such as Gaur. To what extent this is a problem, however, is not known.

Timber extraction

Two types of timber extraction occur to varying degrees in NBCAs:

1. Small scale cutting of trees by individuals (or small groups) of NBCA residents for personal use (e.g., fuel wood, construction of houses and boats), or small-scale sale to outsiders. This is probably the least serious of the sources.

2. Commercial timber cutting by outside agencies or poachers.

Pressure on Lao forests can be expected to increase in light of the recent ban on logging in China following the disastrous floods of the Yangtze River. Because deforestation due to agriculture is more severe in the north, today's logging pressure is greatest in the central and south, where more trees remain.

About 80% of Laos's domestic energy consumption is wood (DoF, undated). The impact that the rural population's collection of fuel wood has on forests is not known. In neighboring countries with much higher populations, however, the problem is severe (Baker *et al.* 2000). It will probably rise in significance as Laos's population increases.

Infrastructure development

Infrastructure development directly converts land to other forms, such as roads, hydropower reservoirs, and rights-of-way for power lines.

Hydropower

In the past decade hydropower has gained increased prominence in the existing and planned economy of Laos. Until 1991, there was only one large dam in Laos (Nam Ngum, commissioned in 1971). Since then, four more have come on line (two with direct impacts on NBCAs) and preliminary construction (e.g., access roads) have been built for others.

Eight or nine proposed hydropower projects are sited in NBCAs or close enough to significantly affect them (Berkmüller 1995; Hydropower Office map). While it is unlikely that all will be built, the proposals illustrate GoL's policy not to completely forfeit the hydropower potential of an area because it is an NBCA. Policy is to try to limit the affects of such dams, and in some cases funnel partial dam revenues to NBCA management.

Roads

Infrastructure development projects damage protected areas not just by direct destruction of

habitat. Often the greatest damage they cause to biodiversity is the creation of access for extensive, long-term extraction of natural resources by outsiders (e.g., hunting, NTFP collection) (MacKinnon 1997, Baker *et al.* 2000). Experience across the globe has repeatedly shown that this is particularly true of roads. An important study in fifteen areas of Borneo found that the density of hornbills, primates, barking deer and bearded pigs in an area had no relation to the area's degree of legal protection. It correlated only with degree of human access. Areas with better access (e.g., near a road), even if legally designated as Totally Protected Areas, had lower wildlife populations than less accessible areas (Bennett *et al.* 2000). In Indonesia, roads were identified as one of the four principal threats to biodiversity in Kerinci-Seblat National Park (MacKinnon 1997).

Consequences of roads in protected areas.

Most have net negative impacts on biodiversity, and often on PA residents

- Loss of habitat from construction and subsequent erosion
- Hunting, snaring and NTFP collection by the road construction crew
- Improved access for hunting by outsiders
- Increased extraction of forest products by outsiders
- Increased export of forest products by PA residents
- Barriers to the movements of some animals
- Increased likelihood of illegal logging and agricultural plantations
- Increased conversion of forest to cash-crop agriculture by PA residents, in response to market access
- Increased settlement in the protected area, along the road
- Affect on local peoples' perception of government commitment to conservation of the area
- Increased burden on the PA staff to control the consequences above

Roads, for logging, security, communication, or development, increasingly affect NBCAs in Lao PDR (Flint and Chantavong 1998). Some are proposed or constructed by the central government (e.g., a planned national road through PDD NBCA in Phongsaly), while others are constructed by provinces, military or the parastatal development companies. Local roads have been built into some NBCAs without consultation with either DoF or the NBCA Head.

Roads are perceived as a means to improve livelihoods of NBCA residents. However, according to a recent GoL study, the poorest rural residents ranked the value of "roads/access to markets" only 8th out of 12 potential measures to relieve their poverty (State Planning Committee 2000a). Roads supply or require things the poor cannot afford: market goods, vehicles and petrol. It will also be very difficult for NBCA management to make a road compatible with the primary land use designation of an NBCA, biodiversity conservation (Berkmüller *et al.* 1995a). Countries with much larger protected area staffs and budgets have tried and failed. Roads open a protected area's resources to exploitation by outsiders, and increase incentives for residents to expand their collection of commercial NTFPs and their cash-crop agriculture.

Some benefits to NBCAs have been claimed of roads. Most commonly cited is improved access for NBCA staff to patrol the forest. However, this forgets that most NBCAs have few staff for patrolling, and the road becomes one of the main features they must patrol to control illegal access to the NBCA. Since most Lao NBCAs have more poachers than patrol staff, improving access for both can only result in a net loss for the area.

When road construction is necessary in an NBCA, it should be realized that, despite best intentions, subsequent use of the road will be very difficult to control. Consequently, it is important that GoL, biologists and NBCA staff cooperate to plan a route for the road that minimizes damage to biodiversity. Phongsaly Province and a European Community project are

providing a good example in the case of road through a forested area in the province (P. Kjøller, pers. comm.).

Forest burning

Forest fires are a significant problem is some NBCAs, e.g., Xe Bang Nouan (XBN), and little problem in others. Causes of the fires are several, and include: swidden burns jumping into the forest; burning for hunting; and burning to promote livestock grazing. In recognition of the problem, suppression of forest fire has become a key policy goal of DoF. Fire control education programs and village fire suppression teams have been formed in some NBCAs, such as NPY.

Mineral and other resource extraction

Limestone quarrying may put pressure on parts of PHP NBCA (FOMACOP 2000), but how much may be planned is not clear. Other types of mining are presently a minor issue in Lao NBCAs, as are oil and gas exploration. Parts of XPN are potentially threatened by peat extraction.

2.6.3 Resource exploitation activities

Collection of non-timber forest products

It is unlikely that the traditional collection of NTFPs for subsistence consumption is a significant threat to the biodiversity of any NBCA (R. Dechaineux, J. Foppes, IUCN/NAFRI NTFP Project, pers. comm.).

The commercial collection of NTFPs in protected areas, however, is a significant conservation issue. It should be noted, however, that the distinction between 'subsistence' and 'commercial' collection of NTFPs is not always a clear one. Annual rice deficits are common in rural Lao. If an NBCA resident needs to collect and sell NTFPs so that his or her family has can buy enough rice to stay alive, that could justifiably be considered 'subsistence' use.

The ramifications for conservation of commercial collection are complex. Generally destructive when done by outsiders, it can also prove beneficial if limited to NBCA residents. If NBCA residents are granted exclusive rights to local NTFPs, they can very quickly become partners in their conservation (Soydara 2000). Many groups have already been sustainably harvesting and managing their local NTFPs for hundreds or years.

Achieving the promise of participatory sustainable use of NTFPs as traditions erode is not easy, however. Baker *et al.* (2000; p. 24) give a concise overview of the dynamics of NTFP exploitation in Laos, Vietnam and Cambodia. It is worth repeating here:

*"Non-timber forest products, such as rattan, Englewood (*Aquilaria*), and wildlife, have already been severely depleted...and in many cases local residents did not benefit from the exploitation of these resources. High levels of demand for NTFP products and improved transport access over the past decade have facilitated greater organization and commercialization of NTFP harvesting and trade. In addition, increasing government control over access to these resources has facilitated unsustainable practices...*

In cases where traditional use of natural resources is threatened by increasing competition for those resources (e.g., poaching wildlife, increased NTFP collection), local residents often abandon their traditional use guidelines in an effort to benefit from the resources before outsiders deplete them. A perception by local residents of even a minor erosion of their mid- or long-term stewardship of natural resources often precipitates unregulated harvesting. This dynamic has resulted in significant pressures on wildlife and NTFPs. In addition, exhausting these resources effectively deprives local residents of their safety net and any opportunities to benefit from more sustainable management of these resources. This effective 'displacement' often forces local residents to venture further into the forests."

Hunting

Like NTFP collection (and wildlife could be considered an NTFP), the impact of hunting on NBCAs depends on whether it is for subsistence or trade.

Subsistence hunting in tropical forests can deplete populations of some animals (Bennett and Robinson 2000). A village of just eighteen households in DAP NBCA estimated that it killed about 50 Douc Langurs per year (Davidson *et al.* 1997). Depending on the size of the area over which this killing occurs (and if others are hunting the same area), this may not be sustainable. Subsistence hunting is especially problematic if the species killed are rare and/or restricted in range, of which Douc Langur is a good example.

The severity of subsistence hunting in NBCAs varies with human population density and with ethnicity. The Kri people of NNT NBCA, for example, have taboos on the killing of all snakes and most large mammals, specifically all large carnivores, wild cattle, elephants and rhinos (Robichaud and Stuart 1999). The Hmong, on the other hand, tend to be enthusiastic and effective hunters of almost everything except snakes (which many Hmong tribes will not touch, dead or alive, in accordance with a taboo).

But even at its worst, subsistence hunting is unlikely to be as damaging as hunting for trade. Numerous NBCA survey reports have cited the harvest of wildlife for trade, often by outsiders, as one of the main threats to the biodiversity of the areas. Some species have already been nearly lost from Laos (e.g., rhinos and the turtle *Cuora trifasciata*). The trade mainly targets animals valued in Traditional Chinese Medicine (TCM). Wildlife valued for meat is also killed for sale to Thailand. Consequently, the problem tends to be most severe in NBCAs near Laos's international borders. Proximity to a border facilitates moving the animals out of the country toward markets in China and elsewhere, and it also allows direct poaching by foreigners who cross the border on forest trails (Nooren and Claridge 2001).

Fishing

Although it could be considered a form of hunting, fishing is treated separately because fish, unlike terrestrial wildlife, are concentrated and confined in very narrow habitat bands in NBCAs, rivers and streams. Therefore, they can be killed more efficiently than most other wildlife. This is especially true if one has access (like many NBCA residents do) to simple but efficient technologies such as nets, explosives and poisons. Consequently, subsistence fishing probably has greater potential to deplete the resource than does subsistence hunting of terrestrial wildlife. Villagers in NBCAs often report steadily decreasing size and quantity of fish caught in their local watercourses over the years. The introduction of explosives fishing in the last few decades is perhaps one cause. Depletion of fish stocks by subsistence fishing is exacerbated by commercial fishing (fish may be sold fresh if a market is close enough, or sold later either as dried fish or fermented fish sauce).

Because fish is the traditional, preferred wild protein source of many rural people in Laos, depletion of the stock intensifies pressure on other wildlife as alternative protein sources (Baird 2000a).

2.6.4 Internal vs. external pressures

Southammakhot (2000) identified four classes of NBCA villages according to their proximity to an NBCA:

Type I	**Enclave village**	Village and village-use land fall entirely within the NBCA boundary.
Type II	**Straddle village**	Village is usually outside the NBCA but some village land falls within it.
Type III	**Adjacent village**	Village and village land border the NBCA, but do not encroach it.
Type IV	**External village**	Village and village-use land are outside the NBCA, but village activities still affect it.

Thus, pressures on an NBCA can be of *internal* origin*,* i.e. the activities of Type I and II villages, whose use rights fall within the NBCA. Or they can be of *external* origin; i.e. from Type IV villages and people or organizations based even further from the NBCA (e.g., timber companies, professional poachers). Whether pressures from Type III village should be considered external or internal depends on the extent that the village's lawful activities affect the protected area.

The separation between internal and external pressures is not always sharp. For example, hunting by internal residents of an NBCA may be driven by external wildlife trade demand. Nonetheless, the distinction is important, since traditional, village-focused ICAD projects deal best with internal pressures, and have limited ability to reduce external pressures (van Schaik and Kramer 1997). Consequently, it is important to understand the unique set of pressures facing a particular NBCA, and select an appropriate management approach.

Table 5 summarizes the types of pressures that are most significant in each NBCA. Much of this information is drawn from the updated *Fact Sheets for National Biodiversity Conservation Areas in Lao PDR* (DFRC, in prep.), supplemented by information provided by NBCA staff and conservation advisers familiar with the areas. Almost all activities listed occur to some degree or another in many NBCAs. For each NBCA, Table 5 lists only those for which specific management attention is required to prevent significant degradation of that particular NBCA.

A root cause of most pressures, internal or external, is human population growth (DoF, undated). Since it is a concern in the long-term protection of *all* NBCAs in Laos, and most of the other pressures have some roots there, it is not listed separately in Table 5. However, it will influence efforts to relieve almost all pressures on NBCAs.

Finally, bombing and the spraying of chemical defoliants by American aircraft during the Indochina war severely damaged the habitats, and possibly wildlife populations, of some NBCAs in central and southern Laos (Steinmetz *et al*. 1999). However, this is damage done, and not an ongoing pressure amenable to management, and therefore it is not listed in Table 5. While unexploded ordnance may remain a threat to villagers in these NBCAs, its net affect on biodiversity is not clear.

Table 5. Direct pressures on NBCAs.

Internal pressures: from residents in or near the NBCA (Type I and II villages)

1.Subsistence agriculture
2. Cash crop agriculture†
3. Subsistence hunting[1]
4. Trade hunting†
5. Subsistence fishing
6. Trade fishing†
7. Trade NTFP collection†
8. Free-ranging livestock
9. Wetland conversion for aquaculture
10. Tree felling[2]
11. Forest burning (for livestock grazing, hunting or as a byproduct of swidden burns)
12. Diversion of water for irrigation

External pressures: from people or organizations outside the NBCA

13. Commercial agriculture, livestock raising
14. Hunting (for trade or recreation)
15. Commercial fishing
16. Commercial collection of NTFPs (e.g., rattan)
17. Unregulated commercial logging
18. Hydropower development (existing or planned)
19. Road construction
20. Other infrastructure (power lines, resorts, etc.)
21. Limestone quarrying
22. Human immigration[3]

† *These 'internal' pressures would not exist, of course, without a considerable external component--market demand.*

[1] *"Hunting" is defined here as the killing or capture of all vertebrates except fish. Invertebrates are considered NTFPs for this table. Hunting at a level that is considered 'significant' can be either hunting at almost any intensity of key species of conservation concern, or intensive (and perhaps unsustainable) collection of taxa that are still common, e.g., frogs.*

[2] *Includes only tree felling for small-scale personal use or sale, not tree felling by residents under the employment of commercial logging projects.*

[3] *Human immigration is more accurately a source of other pressures. It is listed separately because it is critical in some NBCAs, but not others.*

NBCA	SIGNIFICANT PRESSURES	
	Internal	External
DAP	1 3 4 (7?)	14 16 17 18
DHS	2 3 4 5 6 7 9 12	13 15 16 17 19
DPV	3 4 5 6	14 (others?)
HNN	1 3 4 7	14 16 17 19 22
NET	1 3 4 8 10	14 19 22
NHA	1 3 4 7 8 10	13 14 17 19
NKD	1	14 18
NNT	1 4	14 16 17 18
NPY	1 7 11	14 19 22
NXM	1 3 4 8	14 17
PDD	1 (4?)	14 (18?) 19
PHP	1 3 4 10 11	14 17 18 19 21
PKK	1 3 4 7 11	16 17 18 20
PLY	1 3 4 8 10	14 17 19 22
PPN	1 (2?) (3?) (4?) (7?)	14 (16?) 19
PXH	1 4 7 11	14 16 17 19
PXT	4 6 7 8 10	14 15 19 22
XBN	4 5 6 7 11	(14?) 16 17
XPN	1 3 4 5 6 8 12	14 16 18 19 20
XXP	1 4	14 16 19

2.7 OPPORTUNITIES

The previous section detailed the many pressures and threats facing NBCAs. But the news is not all bad. There are also many opportunities inherent in Laos for successful protected area conservation (Steinmetz 2000). A partial list includes:

- ***Low population density:*** This relieves Laos - for the time being - of the greater challenges facing conservation in its neighbors China, Vietnam and Thailand.

- ***Lao people's absence of prior negative experience with protected area management:*** The strife that has sometimes occurred between villagers and PA management in Thailand, India and other countries is unknown in Laos. This gives NBCA managers a chance to start relationships with local people based in trust and free of suspicions formed by previous bad experiences.

- ***GoL commitment to local participation in management:*** Local participation in management will be critical for success, and the support of GoL will make it easier to achieve.

- ***Traditional livelihood systems that converge with protected area priorities***: Many local people in NBCAs throughout Laos follow traditional, forest-based livelihoods, as their communities have for hundreds or thousands of years. They *already* manage many natural resources sustainably. This is valuable starting point for collaborative NBCA management.

- ***Traditional conservation practices:*** Many communities in NBCAs practice indigenous forms of strict biodiversity conservation. Examples are the maintenance of 'spirit forests' or 'spirit pools' where no member of the community may harvest any resources, and general taboos on the killing of certain species of wildlife, such as wild cattle and elephants.

- ***Absence of firm boundaries to most NBCAs:*** This provides an opportunity to involve local people in determining where the boundaries should be, something that was not possible when the system was decreed. This should contribute to good, cooperative relationships between residents and management.

2.8 NBCA MANAGEMENT

2.8.1 Baseline surveys

Once the NBCAs were established, biodiversity surveys and initial management of the areas accelerated in the mid-1990s. These efforts were advised and supported by a variety of donors. WCS took the lead in assisting with the survey work, with additional sites covered by LSFP, FOMACOP (a GEF-World Bank sponsored project), IUCN and WWF. As of 2001, all NBCAs except Phou Phanang have had a biodiversity survey of at least twenty person-days duration. A few have had several surveys totaling hundreds of person-days.

Early surveys focused on field inventories of vertebrates (mostly birds and larger mammals) and general habitats ("wildlife and habitat surveys"). Bats, fish and reptiles and amphibians received focused attention, but few resources were devoted to botanical or invertebrate surveys. Later surveys used a Participatory Biodiversity Assessment (PBA) approach (e.g., Hansel *et al.* 1998, Steinmetz *et al.* 1999). This placed stronger emphasis on the collection of Local Ecological Knowledge (LEK) from NBCA residents, which yielded a better understanding of ecological processes (e.g., seasonal wildlife movements), subtle habitat/wildlife/human associations and patterns of human resource use. Overall, the NBCA surveys of the 1990s generated a wealth of information, where little existed before, on the biodiversity of Laos, its international significance, and priorities for conservation.

2.8.2 Management projects

2.8.2.1 Overview

The first donor-assisted management project in an NBCA began in PKK in 1993. Assisting partners were LSFP and IUCN. Eventually, through 2001, LSFP would provide technical assistance to management in four NBCAs, IUCN to five, FOMACOP to four, WCS to one and WWF to one. Several donors have supported these projects, principal ones being Sida, World Bank, Global Environment Facility, DANIDA and the Netherlands government.

Typically, projects have had durations of 3-5 years, with full-time input of a foreign adviser, and shorter inputs of technical assistance for wildlife surveys, staff training, etc. Naturally, effort has not been uniform across NBCAs, and has been distributed as follows:

Comprehensive, multi-year financial and technical support to management: 8 NBCAs	**Partial or intermittent support to management: 8 NBCAs**	**Little or no support to management: 4 NBCAs**
DHS NET NHA PHP PKK PLY PXH XPN	DPV HNN NNT NPY PPN PXT XBN XXP	DAP NKD NXM PDD

As recently as 1999, 11 NBCA donor projects were operating simultaneously, but several have recently come to a close. Management by local staff has, of course, continued, but the year 2001 finds the NBCAs in a quieter phase of donor support. At present there is major donor support to just four or five NBCAs. Some other projects, however, are working in or near some NBCAs on related activities such as rural poverty alleviation and ecotourism.

Table 6 summarizes management activity in the NBCAs.

Table 6. NBCA management support.
Adapted from Southammakhot (2000).

NBCA	Management History	Comments
DAP	1997: WCS/CPAWM field training for NBCA staff some WWF staff training	no staff or mgt. at present
DHS	1995-2000: IUCN-advised mgt. project 2000-2002: Dutch funding extended for management	
DPV	1996-2000: Minor FOMACOP mgt. assistance	
HNN	1998: WCS/WWF/CPAWM field training for NBCA staff 1999-2001: WWF-advised mgt. project	
NET/PLY	1998: WCS/CPAWM field training for NBCA staff 1999-20001 IUCN-advised assistance to mgt. planning	
NHA	1996-99: WCS & DED mgt. assistance. 1999: WCS/CPAWM field training for NBCA staff 2000-02: UNESCO ecotourism project near the NBCA	Current activities confined to pilot ecotourism project.
NKD	none	no staff or mgt. at present
NNT	1998-2000: Intermittent IUCN/WCS/World Bank-assisted mgt. activities 2000-02: World Bank-supported Learning and Innovation Loan project;	
NPY	1993-2000: LSFP/IUCN mgt. assistance.	
NXM	none	apparently no staff or mgt.
PDD	none	EU forest conservation project in province, but no NBCA activities
PHP	1996-00: FOMACOP mgt. assistance.	
PKK	1993-00: LSFP & ADB assistance to mgt. 1999: WCS/CPAWM field training for NBCA staff	Ongoing management by Ministry of Defence
PPN	1997-98: CPAWM conducts some village activities (with support from Canada Fund)	
PXH	1994-2000: LSFP/IUCN mgt. assistance.	
PXT	1996-00 IUCN/PDI mgt. assistance	
XBN	1993-00: intermittent LSFP/IUCN mgt. assistance. intermittent activities by IUCN/NAFRI NTFP project	
XPN	1996-00 FOMACOP mgt. assistance. 2000-01: DANIDA mgt. assistance	
XXP	1996-2000: minor FOMACOP mgt. assistance	

2.8.3 Management strategies

Different donor-assisted NBCA projects have taken different approaches to management implementation. The models used can be broadly grouped as follows:

Integrated Conservation and Development (ICAD)

GoL feels that ICAD is the most suitable approach for protected area management in the Lao context (Southammakoth and Craig 2000a). It has its greatest potential in NBCAs where aspects of the livelihood systems of residents (e.g., pioneering agriculture) are the principal threat to the area's biodiversity.

In various forms the ICAD approach has been used by a diversity of GoL-donor joint projects: LSFP-assisted projects in NPY, PKK, Phou Xang He (PXH) and XBN; FOMACOP projects in PHP and XPN; IUCN's Biodiversity Conservation Project (BCP) in DHS (and to a limited extent in PXT); phases of the WCS-assisted project in NHA, and WWF's project in HNN. Population and Development International (PDI) has implemented a rural development project with some ICAD-like components, but a less explicit link to conservation, in villagers around PXT (and will soon start at XBN).

Recently, an effort has been made by IUCN and DFRC (with financial support from DANIDA) to

incorporate many of the 'lessons learned' from these ICAD attempts into an improved model, appropriate to Lao circumstances. This new approach is being tested in the contiguous NBCAs of NET/PLY. The project's most significant difference from its ICAD predecessors is a long (two years) initial phase of field assessment and planning, which is underway at this writing. The goal is to gather an extended, in-depth understanding of the problems of the NBCAs, the socio-economics of the area, and local management capacity before preparing a management plan. MAF/DoF hope that the refinements this project develops will be more widely applied to future management in other NBCAs.

The ICAD approach in Laos assumes, or at least implies, three logical links:
1. Protected area residents have a net negative effect on biodiversity.
2. The root cause of this negative effect is 'poverty.
3. Alleviation of poverty through development interventions is a prerequisite for protected area conservation.

Reality, of course, is more complex. Notions of 'poverty' can be too simplistic, and the role that traditional Loa communities play in enhancing biodiversity is sometimes left unexamined. These issues are discussed Box 3.

Participatory Management (PM)

Participatory Management is more a style of management implementation than a management model. PM is a means and philosophy endorsed by GoL to involve villagers not only in the activities of NBCA conservation, but in decisions about NBCA management (Southammakoth and Craig 2000b). [Note: the terms *Co*-Management, *Joint* Management or *Collaborative* Management (Fisher 2000) are probably better than "Participatory Management"; it is possible to participate in management--as parties to discussion, or as laborers--without taking part in management decisions. However, we use "Participatory Management" to maintain consistency with common usage by DoF and DFRC]. Like the ICAD model, PM integrates well with MAF/DoF policy to delegate NBCA management to the local level.

Two premises of PM [adapted from Steinmetz (2000)]:

- **Local people *already* manage their local resources, frequently in a sustainable manner. This should be the starting point for management projects introduced from the outside.**

- **The presence of indigenous people can benefit a protected area, and these benefits should be consciously fostered by management.**

One of the first applications of PM in Laos was in the early 1990s in a conservation project outside of an NBCA, the Community Fisheries and Dolphin Conservation Project in Champasak Province (Baird 2000b). The project succeeded in involving more than sixty villages along the Mekong River in self-designed, self-directed conservation of their wild fisheries.

Subsequently, the PM approach was used in NBCA biodiversity surveys, most notably in the Participatory Biodiversity Assessments that WWF-Thailand undertook for the FOMACOP projects in DPV, PHP, XPN and XXP (e.g., Steinmetz *et al*. 1999). It was also used by WCS/CPAWM as part of its surveys in NET/PLY, Nam Xam (NXM) and XXP (e.g., Hansel *et al.* 1998).

BOX 3. "POVERTY" AND "CONSERVATION": CAUSE AND EFFECT

Robert Steinmetz
WWF-Thailand Project Office

Traditional societies exist in almost every area of high conservation significance in the world; Lao PDR is no exception. Is this an accident of geography, or does some pattern underlie this distribution of nature and society?

Regardless of ethnic affiliation, local societies near protected areas often share social and economic characteristics that promote low-impact relationships with the natural environment. The pervasive, unquestioned use of modern definitions of "poverty", "development", and "conservation" can obscure positive aspects of this relationship between local societies and the environment. This can lead to conservation approaches that ignore root causes of ecological degradation, and bring 'solutions' that only further reduce local capacity to live within ecological limits.

The condition of the environment varies with the values, knowledge, technologies, and social organization of its human inhabitants. Traditional societies represent a more balanced arrangement of these five co-evolving aspects of human development. This explains why traditional societies in Lao PDR are often located near areas suitable for conservation. Low environmental impact is not simply a function of low population. The depletion of many large mammal species (e.g., Banteng, Tiger) from areas where human populations are low is an example.

Helping local societies maintain local economies and culture can be part of the solution to conservation problems. Within traditional communities, values such as cooperation, fairness, equity, sufficiency, and reciprocity remain. These values inform collective decision-making, and influence a range of concerns including the maintenance of ecosystem services so crucial for conservation. Villages in Khammouane Province, for example, protect communal forests as reserves of forest products and game, for present and future generations. Unsustainable exploitation through individual greed is constrained through such community institutions.

Local communities benefit from the environment for sustenance and income, but their livelihoods can also suffer from adverse local ecological impacts. This is the basis for human-environment feedback that is necessary for economies to be sustainable. For example, rice farmers in the dry dipterocarp forests of southern Lao PDR recognize the importance of forests as a source of water and nutrients for their paddy fields. Maintaining rice harvests depends on maintaining sufficient forest cover.

Today, a single worldview today commands the attention of many concerned with conservation and development. Under this view, the scenarios described above are dismissed as "poverty", and their eradication seen as "development", as well as the solution to conservation problems. Rather than explore positive aspects of traditional societies, the modern worldview starts with a gloomy judgement of what they lack in comparison to a single western standard. The goal has become to replace varied traditional economic systems with a single one that attaches people to distant and uncontrollable markets, severs local environmental feedback loops, installs "market value" and individualistic competition as sole decision-making values, commodifies natural resources, and promotes expensive low diversity agriculture. These are the very features of modern economic systems that degrade the environment on a global scale, yet they are promoted as solutions at local scales. The conservation community should begin to question its definitions of 'poverty' and 'development', and how these are linked. If not, the seeds of local conservation and sustainability within traditional societies will be lost in the hasty application of outside solutions that are actually part of the larger problem.

But PM's widest application has been, in various degrees and styles, in NBCA management projects. Virtually all NBCAs management projects in Laos have taken some sort of PM approach. It has probably had its most comprehensive expression in XPN, where Joint Monitoring Teams have been established in a few villages (Steinmetz 2000). This emphasis on a joint approach makes the Lao protected area management philosophy one of the most

progressive in the region.
Because many pressures on an NBCA come from outside its borders (Table 5, Section 2.6.4), fostering participation of NBCA residents alone will not be enough to achieve successful conservation. It is necessary to promote the participation of *all* local stakeholders, including:

- district governments, especially their planning committees
- provincial governments and their planning committees
- parastatal development companies such as BPKP
- the army
- customs units
- local businesses, such as tour operators

The lack of participation of these other local stakeholders in NBCA management planning has been one of the principal causes of weak NBCA conservation.

The IUCN-assisted project in NET/PLY is attempting to address this weakness, and broaden the scope of local participation in planning the future of the two NBCAs. The project considers it so critical to the success of an ICAD approach that it has adopted the acronym "PICAD" (Participatory, Integrated Conservation and Development) to describe its strategy (C. Flint, IUCN, pers. comm.)

Pressures Reduction
PR is an adaptation of an approach to protected area management described by Salafsky and Margolius (1999) (they termed the method "Threats Reduction Assessment". It is well suited to PA management in developing countries because it is cost-effective, the links between activities and results are very clear, and results are readily monitored without advanced technical training. Pragmatism is PR's defining character.

PR is actually a monitoring method, but its use influences the way protected area management is planned and applied. The concept is based on the following logical sequence of premises:

1. Investment in protected area management is justified only if there are local and identifiable pressures on the area's biodiversity that management can influence (e.g., if air pollution from a remote source is the only threat to an area, there is little management can accomplish)

2. The only appropriate management strategy is one that is likely to reduce the pressures identified.

3. A management project should be monitored for effectiveness.

4. It is difficult to monitor biodiversity directly. It is usually simpler to monitor the pressures on biodiversity. For example, it is easier to monitor the density of snares in a forest than the population trends of deer in the same forest. A project with limited funds and staff, therefore, should focus monitoring effort on the pressures on biodiversity.

The PR process also ranks the pressures on the biodiversity of protected area, allowing limited resources to be put where they are most needed.

PR is not a substitute for an ICAD approach. Rather, it is an efficient way to insure that the link between 'Conservation' and 'Development' is robust. Rural development might be the best means to reduce the significant pressures identified by the PR process. But development in this case is a *tool* to achieve the *goal* of pressures reduction (and, therefore, biodiversity conservation). While this relationship is usually recognized in ICAD descriptions and management plans (Chantakoumane 2000), in the field the distinction between development as a tool and as a PA management goal is sometimes lost. When that happens, there is the risk of development proceeding with only a vague idea of its potential affect on biodiversity. PR helps keep the link in focus.

To date, the method has formally tried to a limited extent in NHA NBCA (Johnson 2000), and elements have been incorporated into the management of DHS. Its incorporation into ICAD approaches in Laos generally merits consideration.

2.8.4 Other projects supporting NBCA management

Land allocation and land use planning
Approximately 1,100 villages are inside or within five km of the 20 NBCAs (Southammakhot 2000). Consequently, land allocation (LA) is an important adjunct to NBCA conservation. Since 1995, GoL has been developing and implementing an ambitious nationwide program of village LA.

A separate effort, with assistance from LSFP, has concentrated on developing special LA and Land Use Planning (LUP) methods for NBCAs (Sawathvong *et al.* 2000, Southammakoth *et al.* 2000). The special focus given to NBCAs arises from GoL's twin understanding that:

- LA/LUP is required for successful NBCA management;
- LA/LUP must proceed differently in and near NBCAs than it does generally; village land-use claims must reconciled with the conservation objectives of the NBCAs and with NBCA zonation.

The LA model for NBCAs has developed adaptively, through experience. A principal distinction from standard practice is its longer duration, with additional steps, to insure that the process integrates with NBCA management. Ideally, it incorporates a longer phase of monitoring and follow-up. LSFP has tested the model in primitive to fairly refined forms in selected villages in or near four NBCAs: NPY, PKK, PXH and XBN (Sawathvong *et al.* 1999; P. Jones, LSFP, pers. comm.).

Done properly, completion of participatory village LA in all NBCAs will be a huge task. A minimum average of seven trained extension workers need one week to properly complete LA in one village (P. Jones, LSFP, pers. comm.). If preparations, travel to-and-from the village and reporting take another week, then 300 person-***years*** of trained input will be required to complete the process for all NBCAs. Nonetheless, it is critical that it be done carefully and correctly. If not, it will only have to be repeated, and villages and biodiversity may both suffer in the interim.

Gun collection
Hunting is a major suppressor of wildlife populations in Laos, from the smallest birds to the largest ungulates (Duckworth *et al.* 1999). Hunting guns (mostly hand-made, small-bore muzzleloaders) were until recently ubiquitous in rural Laos. Since about 1996, however, the quantity of guns possessed by Lao villagers has declined dramatically. This is the result of a focused government program of gun collection.

The effort has probably benefited wildlife inside and outside NBCAs, although there are no studies to confirm this. It has also simplified NBCA management in one important respect: In areas where local government has collected guns, NBCA management does not need to negotiate either their surrender or restrictions on their use with residents.

It is important to understand, however, that gun collection is not permanent. Removing the *means* to perform an act seldom is, without also removing the *desire*. New guns are easily and cheaply made and hidden from the authorities. Over the long-term, therefore, it will be necessary to reduce the widespread cultural interest in hunting. Public awareness activities, described next, have a significant role to play.

Public awareness

Successful, long-term conservation is a process of shifting social and cultural attitudes. That is, modifying behavior instead of simply trying to control it through coercion (Vanalath 2000). Public conservation education, then, is a critical component of any NBCA management strategy. While it has been a component several NBCA projects, it is discussed separately here for this reason: If NBCA conservation is to succeed, conservation awareness-raising cannot be confined to NBCAs, but must be general and widespread. For example, cooperation of villagers in an NBCA is insufficient if poaching of wildlife and NTFPs continues by residents of nearby towns.

DoF places greater emphasis on public awareness than on imposing penalties for the implementation of NBCA regulations (LSFP and DoF 2000).

Several donor projects have assisted GoL in the production of conservation education materials for distribution on National Wildlife Day, and more generally. The WCS/DoF partnership has been most active in this regard, assisted financially by such donors as the Danida, IUCN Netherlands Committee and the Japanese Embassy. In addition, many NBCA management projects have produced their own education materials, designed for the unique needs of the particular NBCA.

GoL recognized the general importance of public conservation awareness when, in the Forestry Law of 1996, it established a "National Wildlife Conservation and Fish Release Day", to be celebrated every year on July 13. Each year since 1997 this has been a major stimulus and vehicle for spreading the conservation message nationwide through a diversity of media.

Ecotourism

The first official ecotourism project started in Louang Namtha Province in 1999, with assistance from UNESCO (see Box 4). It offers day or overnight treks and village stays near Nam Ha NBCA. Other NBCAs with ecotourism activities or planning are:

DHS: Project involving elephant rides under early, low-level implementation.

PHP: Planning in progress with assistance of a United Nations Volunteer.

PKK: National Tourism Authority (NTA) developing trekking routes.

PXH: Pilot trekking tours tested, but have not been developed further.

XPN: Local tour operators, in cooperation with the NBCA, offer elephant rides.

Ecotourism is still in its very early stages of development in Laos, but already it shows great potential to benefit many of the local stakeholder, and consequently the NBCAs.
It can reduce poverty in local communities and lower the immediate need to exploit natural resources to meet basic income needs. At the same time, it makes a strong link between income generation and biodiversity conservation. It can also generate funds for the NBCA and, perhaps more importantly, it can generate support for the area's protection among villagers and local government. The latter has been an obvious and surprisingly quick benefit of the project near NHA. Therefore, ecotourism that is well-managed to avoid damage to NBCAs can play a very positive role in NBCA management.

Increasing tourism is a goal of Lao PDR's National Socio-Economic Development Plan. The National Tourism Authority reports that while most tourists to Laos concentrate on cultural and urban attractions, 70% express an interest in nature tourism. The potential is strong then, to

gradually expand ecotourism to other NBCAs for which it would be appropriate. It is important, however, that it be developed to:

- minimize negative impacts on the NBCAs; the goal of ecotourism is to enhance NBCA management, not complicate it;
- channel significant revenues directly to NBCA management and cooperating villages; without that, the links to conservation will be weak.

BOX 4. THE NAM HA ECOTOURISM PROJECT

Steven Schipani[1] & Khamlay Sipaseuth[2]

[1] United Nations Educational, Scientific and Cultural Organization (UNESCO) Chief Technical Adviser, Nam Ha Ecotourism Project
[2] National Tourism Authority of the Lao PDR

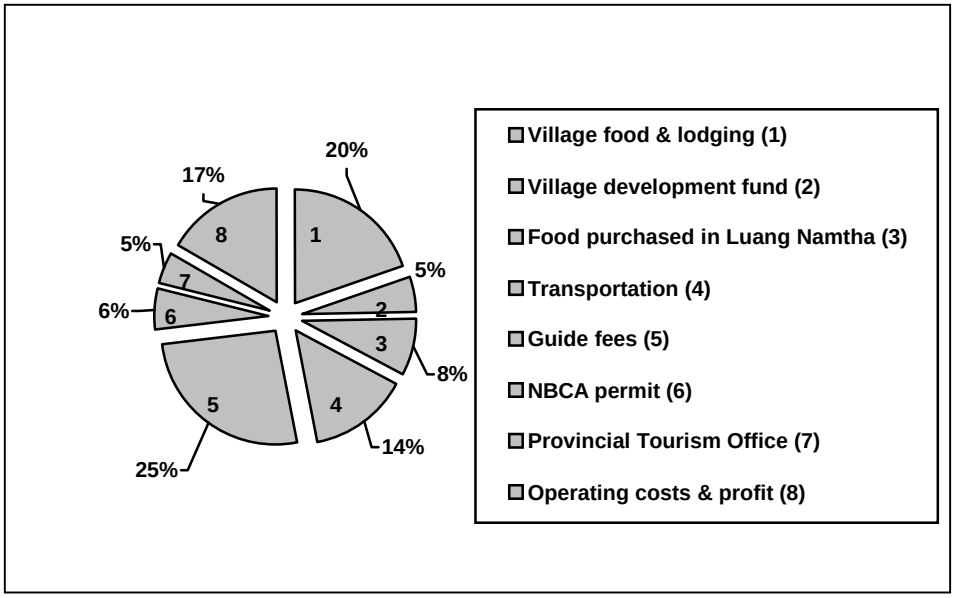
The National Tourism Authority of the Lao PDR (NTA) is implementing the Nam Ha Ecotourism Project near the Nam Ha National Biodiversity Conservation Area (NBCA) in Louang Namtha Province, with cooperation from the Department of Forestry and the Ministry of Information and Culture. UNESCO is the executing agency, providing technical assistance and monitoring.

The rich cultural and natural assets found in and around the NBCA make it an excellent candidate for ecotourism activities. To meet international tourists' growing demand for environmentally and culturally sustainable programs, the Nam Ha Project has developed an overnight guided trek to Ban Nalan, a Khmou village in the NBCA's buffer zone. This village had been designated an NBCA "guardian village" after establishing a natural resource management plan in cooperation with the protected area management unit. Such plans usually involve a trade-off, whereby villagers agree to forego certain immediate economic benefits from extracting and selling NBCA resources, to support long-term conservation objectives. It is hoped that income generated by the trekking operation will be a strong incentive to protect the area's wildlife and flora, and encourage villagers to conserve their material and traditional culture; the very resources that make the trek so attractive to tourists.

In addition to the economic benefits of the trekking operation for the five local communities involved and other stakeholders (see financial summary), the NBCA management unit is realizing substantial revenue from the sale of trekking permits. This is a critically important aspect of ecotourism in Laos, where internal funding for protected area conservation is very low. The cost of a trek includes $ 1 per day or $2 for the overnight trek for the purchase of a permit. These permit revenues go to the NBCA. From December 2000 - March permit sales totaled US$ 384.

Due to the success of the present trekking operation, the project plans to develop additional trails inside the NBCA, consistent with the conservation objectives of the protected area. Concurrent with the development of such activities will be explicit resource conservation and monitoring agreements between the NBCA management unit and involved communities to further strengthen the linkage between ecotourism and protected area management.

Distribution of economic benefits from the Nam Ha Ecotourism Project's Ban Nalan trekking trail.



IUCN/NAFRI Non-Timber Forest Products Project

For several years, IUCN, DoF and, lately, the National Agriculture & Forestry Research Institute (NAFRI) have collaborated on a major project to explore the sustainable management of non-timber forest products. Goals are biodiversity conservation and rural livelihood enhancement (Ketphanh 1998, Foppes and Ketphanh 2000). While not an NBCA management project *per se*, pilot projects have been conducted in XBN and XPN. A third focus site is in the northern province of Oudomxay.

The project has identified direct links between conservation and rural livelihood enhancement. It has also been instrumental in showing two things: The great value of forest products to rural Lao people and the national economy, and the positive effects that long-established, indigenous residents of an NBCA can have for management. Given rights of exclusive access to forest resources, they can become the best guardians of these resources.

3 ANALYSIS AND OPTIONS

3.1 ACHIEVEMENTS

This section on "Analysis and Options" is mainly, and naturally, a discussion of weaknesses in the Lao NBCA system and options for progress. First, however, a summary of the system's major strengths and achievements is warranted.

- ***A scientifically designed protected area system.*** The most significant achievement of the past eight years is the establishment of the NBCA system. A commonly cited weaknesses of nature reserves around the world is the *ad hoc* manner in which they were established, with little attention to principals of conservation biology (Pressey 1994). Lao PDR, although one of the more disadvantage countries in the region in terms of financial and human resources, has legally defined an integrated, extensive set of protected areas designed as a system on sound scientific principles. In this it is matched by almost none of its neighbors and, indeed, by few countries in the world.

- ***An appropriate commitment of area.*** IUCN has recommended that nations designate 10% of their land as biodiversity conservation areas (McNeely and Miller 1983). Lao PDR has achieved this, and there are only three or four other countries in all of Asia also approach the 10% figure (MacKinnon 1997). Laos has laid an outstanding foundation from which to be seen by other countries as a progressive and farsighted example.

- ***A sound information base.*** Starting from a virtual absence of information about the NBCAs, in the 1990s GoL has guided an impressive collection of information on their biodiversity. Most of it was compiled under the auspices of DoF into the landmark publication *Wildlife in Lao PDR: Status Report 1999* (Duckworth *et al.* 1999). The work documents the status of every vertebrate, excluding fish, ever known to have occurred in Laos. No summary of similar comprehensiveness exists for any other Indochinese country. While information gaps remain (especially in botanical knowledge), in a very short time Lao PDR has built an excellent information base for management planning.

- ***Progressive management policy.*** Management planning for the NBCAs has been guided by DoF's clear and progressive policy to involve local stakeholders. Management emphasis is on cooperation, rather than confrontation or resettlement.

- ***Management implementation.*** Management projects have been undertaken in most NBCAs. Granted, effectiveness has been variable and, in fact, is little known (i.e., have the projects contributed to the main NBCA objective, biodiversity conservation?). But a start has been made, methods tried, lessons learned, and a foundation for future progress established. The effort has also permitted DFRC to produce two other important publications, the comprehensive *Fact Sheets for National Biodiversity Conservation Areas in Lao PDR* and a *Manager's Guide to Protected Area Management in Lao PDR*.

In summary, in the eight years since PM Decree 164 was signed, Lao PDR has laid a foundation of great promise for conservation of its rich biodiversity in protected areas. Realizing this promise through effective management will, naturally, be more difficult. Some observations and options which may prove helpful are offered below.

3.2 LEGAL ISSUES

3.2.1 Implementing regulations to the Forestry Law

According to central, provincial and NBCA staff, a high priority for the advancement of NBCA protection and management is resolution of the confusion over the legal standing of NBCAs left by Decree 164 and the Forestry Law. For example, it is difficult to begin discussions of co-management with villagers in NBCAs if their legal use rights in the area are not clear.

The Forestry Law regulations on protected areas and wildlife that have just been drafted by DFRC and DoF represent the 'last chance' for the near future to resolve some of the uncertainties on the legal status of NBCAs. DoF recognizes the importance to prepare them carefully and properly (LSFP and DoF 2000). At this writing the draft is under review by MAF, so no copy is available for discussion.

3.2.2 Zonation

The Forestry Law and GoL policy provides for NBCAs to be divided into Totally Protected Zones and Controlled Use Zones (Southammakoth *et al.* 2000). Some observers suggest that TPZs are inappropriate in the Lao context because NBCA residents are heavily dependent on NTFPs and other forest resources, and in fact may contribute to conservation through indigenous management. But it very much depends on which NBCA one considers. Most of some NBCAs, like XBN, fall into areas villagers claim traditional use rights to. But others, such as NNT, NKD and NET/PLY, have substantial portions that villagers rarely visit, and do not claim rights to.
Furthermore, division of NBCAs into zones follows

There are excellent reasons to designate unused areas of NBCAs (and others when appropriate) as TPZs, in consultation with NBCA residents and local government:

- The human populations in NBCAs are growing. While villages may not use some forest areas now, they will certainly try to expand into them as their populations grow. But if all stakeholders are made to understand that the use of these areas are restricted in perpetuity, they will be compelled to find better, more sustainable solutions to the problems of increasing population than simply encroaching further into the forest. NBCA residents *will* reach the end of the useable forest someday, either when it is all gone or at an international border. We only suggest that they reach it at the boundary of a TPZ.

- Thresholds of "sustainable use" of tropical NTFPs and wildlife are virtually unknown. Caution suggests that some areas be left alone while action research attempts to determine such levels elsewhere.

- Rural Lao communities have gone through many upheavals in the last several decades, mainly as a consequence of the Indochina war. Many communities have shifted from their traditional locations and/or their traditional livelihood systems (Goudineau 1997). Consequently, indigenous management systems have been disrupted in some areas, and therefore resource use in some areas is no longer sustainable.

3.2.3 NBCA boundaries

PM Decree 164 delineated the NBCA boundaries only approximately (at 1:500 000 scale). Various extensions and excisions to these approximate boundaries have since been proposed. This situation has resulted in two constraints on management:

1. There is no consensus on the size and boundaries of many NBCAs.
2. The administrative and legal mechanism for defining the proper boundary is unclear.

NBCA Heads often cite unclear and/or unmarked NBCA boundaries as a constraint to participatory management. It is difficult for them to work with villagers on land use planning if no one is quite sure where the NBCA begins and ends. Logging has occurred in some NBCAs because local officials were unclear of the area's boundaries (World Bank and Sida 2001).

In a study of the effectiveness of 93 tropical protected areas Bruner *et al.* (2001) found that an important factor for successful PA conservation is the degree to which the boundary of an area is marked. The absence of clearly marked boundaries in Thailand is a critical constraint to the management of its nature reserves (Sumardja 2000).

Nonetheless, the absence of clear NBCA boundaries offers an opportunity.
It should now be possible to involve local residents in decisions about where the boundaries should be, something that wasn't possible when the areas were decreed in 1993. This could prevent future tension between residents and management.

3.2.4 Options to clarify legal issues

➢ ***Forestry Law regulations***

Whatever form the final implementing regulations for protected areas takes, for the benefit of the protected area system and the simplification of management they should be written to:

1. Accurately reflect GoL's NBCA management policy, and clearly define the objectives of the NBCAs within the context of this policy.
2. Clarify the status of NBCAs relative to the five classes of forest in the Forestry Law.
3. Keep restrictions on activities inside the areas consistent with GoL policy, especially GoL's desire to pursue a management model of integrated development and conservation.
4. Clearly define the lines of responsibility for granting exceptions to the regulations and to relevant articles of the Forestry Law.

GoL should also consider framing the definitions of the areas according to the internationally recognized IUCN protected area categories.

It is also important to remember that finalization of the regulations will not complete the process of putting the NBCAs on a firm legal basis. At least two more steps are needed:

1. Preparation and issuance of MAF "Instructions" for implementation of the regulations;
2. *Effective* dissemination of the regulations to all GoL agencies potentially concerned with NBCAs. These include:
    - offices of provincial and district governors
    - provincial and district planning committees
    - PAFOs, DAFOs
    - NBCA Heads
    - other MAF Departments, such as Livestock and Fisheries,
    - ministries responsible for infrastructure development, or other activities in which NBCAs might play a role, e.g., Industry and Handicrafts, Defence;
    - parastatal development companies such as BPKP and DAFI.

GoL should maintain the present momentum and pursue these activities as soon as possible after adoption of the regulations.

➢ ***Boundary demarcation***

A donor could make a great contribution to the management of the NBCAs by providing assistance to GoL to define the NBCA boundaries. A team (or teams) of professional surveyors, experts in local participatory planning and DFRC/DoF staff could visit each NBCA and, in partnership with local authorities and key stakeholder villages, do the following:

- Determine where the NBCA boundary should be, and propose it to MAF/DoF and the provincial governor for approval.
- Once approved, map it at a fine scale in a GIS database.
- Help mark it permanently on the ground where it does not follow clear geographic features,

such as rivers.

The interdisciplinary team(s) could tour the country helping local authorities at each NBCA until the job is complete. It will be an expensive and long process, especially if the critical involvement of local residents is properly fostered, but it would be matched by the magnitude of the benefits. Consideration should be given to simultaneously attempting (at least in a preliminary manner) NBCA zonation and land allocation in NBCA villages.

3.3 POLICY ISSUES

3.3.1 Overview

As noted, there are many positive aspects of NBCA policy. We suggest, however, that policy on NBCAs and their objectives needs to be made clearer. Stakeholders at various levels--NBCA staff, central staff, donor agencies-- express confusion about the intended functions of the areas. The following contrasting views on the function of NBCAs illustrate the issue:

Statements of NBCA Priorities	
Decree 164 and the Forestry Law (1993 and 1996)	**GoL Comments (2000)**
• "...to protect and preserve natural resources such as forest, wildlife, and water, to keep their existence forever." • "...to maintain the richness as well as to preserve the flora and fauna species and biodiversity"	• "[NBCA] Management plans currently focus too heavily on conservation, and should include development plans in the fields of agriculture, health, education, gender, sustainable use of NTFPs, handicraft production, tree plantations and forest rehabilitation." (LSFP and DoF 2000) • "The Government's highest priority in protected area management is to promote development of alternative livelihoods in key villages around NBCAs - as a strategy for reducing dependence on forest products and thus degradation of biodiversity resources." (Southammakhot 2000)

The differences (one an emphasis on biodiversity, one an emphasis on development) may reflect no change in policy towards the NBCAs, but instead a lack of care in distinguishing NBCA management *objectives* (biodiversity conservation) from management *methods* (e.g., integrated rural development). It should be acceptable to focus on conservation in a "National Conservation Forest", if management incorporates rural development as a method to achieve this.

This is not a small issue. The Head of an important NBCA recently reported that it was difficult for him to design management for his area but he was not sure if the principal management objective should be rural development or biodiversity conservation. And if the application of IUCN Protected Area categories to the NBCAs is thought desirable, a clearer statement of the areas' objectives will be needed.

3.3.2 Options to clarify policy

The protected area implementing regulations that are under review by MAF provide a good opportunity to clarify the current evolution of NBCA policy. In the meantime, examination of the legal instruments that define the areas and of GoL policy statements suggests that a statement of NBCA objectives could be similar to:

> *The objectives of the NBCA system are the protection of large natural areas for biodiversity, ecological stability, watershed functions, and aesthetic and cultural values for the benefit of the nation as a whole. Achievement of these objectives should proceed through local participatory management in a way that, whenever possible, benefits traditional residents of the NBCAs and contributes to national development while remaining consistent with the objectives of the areas.*

It would be beneficial, for example, if the next editions of the *Manager's Guide* and the NBCA *Fact Sheets* contained a policy statement of this general type.

3.4 INSTITUTIONAL ARRANGEMENTS

3.4.1 Staffing

3.4.1.1 Local level

DoF, LSFP and FOMACOP coordinated a comprehensive survey of provincial and district forestry staffing in 1998 (LSFP *et al.* 1998). At that time, 202 staff nationwide were assigned to conservation duties, although not all in NBCAs. This is 20% of all staff assigned to the Forestry Offices within the PAFOs and DAFOs, which is less than half the proportion that protected areas (including provincial and district areas as well as NBCAs) comprise of forested land. In other words, protected areas are staffed at a much lower rate than their contribution to remaining forests.

Expressed as of hectares of NBCA per staff person, staffing intensity in 1998 varied from (at most) about 2,246 hectares/staff person to 170,000. Most NBCAs with donor support have had between 8 and 20 staff to cover areas usually of 80,000-200,000 ha. These are extremely low average rates of staffing to implement management effectively. The only exception is PKK, which is managed by the Ministry of Defense and has more than 90 staff for 200,000 ha. At the other extreme are some NBCAs with no field staff.

Since the 1998 publication of the report, much has changed, due in part to the cessation of the main phases of several NBCA donor projects. At the provincial level, many staff assigned to NBCA donor projects were transferred elsewhere once the projects ended. High staff turnover is frequently cited as a constraint on management progress (e.g., Sengsavanh and Evans 1997). Despite the many donor resources devoted to capacity-building and training, in 2001 staff levels in some NBCAs are lower than four or five years ago (IUCN 2001). On the positive side, many of the NBCA staff who remain are much better trained and experienced than before. There are some excellent, dedicated NBCA staff working on the ground in some NBCAs. There just needs to be more of them. Donor projects have been effective at staff *training*, but they have no influence over long-term staff *numbers*, or if the staff they spend time and money training will remain assigned to the NBCA.

3.4.1.2 Central level

Much has also changed at the central level since the DoF capacity study in 1998. DFRC replaced CPAWM, and many staff were transferred to the provinces. The policy to send central staff out to assist at the local level is an excellent one in many respects. It puts DoF's human resources where the day-to-day work of forest management happens. Unfortunately, for protected area management, specifically, the restructuring may not have been beneficial. The reason is that none of the CPAWM/DFRC staff sent to the local level were assigned to assist with DFRC's core functions, NBCAs and wildlife conservation. The PA support staff in Vientiane has been depleted, but this has not translated into improved PA management at the local level. The central staff capacity (i.e., DFRC) is widely recognized to be far short of that needed to coordinate and service management of the 20 NBCAs (Flint and Chantavong 1998, LSFP *et al.* 1998).

The advantages and disadvantages of reducing central PA staff can be summarized as:

ADVANTAGES	DISADVANTAGES
• disseminates central expertise to local level • provides more staff for conservation implementation in the field • provides field experience for central staff, so they gain first-hand understanding of conservation challenges • can improve communication between central and local levels	• limits DFRC's ability to provide services such as GIS/mapping and training • limits DFRC's ability to coordinate management of the NBCAs as a system • conservation staff sent to local level are often used for other activities • severely limits DFRC/DoF's ability to contribute to cross-sector conservation initiatives, such as the National Biodiversity Strategy and Action Plan • severely limits GoL's ability to participate in international agreements such as Ramsar and CITES.

3.4.1.3 Gender balance

Women and girls comprise approximately 50% of the population of an NBCA, and they are very important resource users. They are the principal gatherers of many NTFPs, and play a major role in most agricultural activities (see Box 5). Yet the number of women assigned to local NBCA management staffs is small (Souvanthalisith 2000). Furthermore, the few women involved are generally assigned administrative and secretarial tasks, and rarely visit an NBCA. This is in part due to a cultural belief that government forest work is men's work. This is somewhat ironic, since much of the 'forest work' done at the village level (e.g., NTFP collection) is the responsibility of women. Other cultural attitudes and gender imbalances in education also prevent full contribution of women to NBCA management (LSFP *et al.* 1998).

More participation of women in NBCA management comes from local representatives of the Lao Women's Union (LWU) than it does from Forestry staff. The links may be informal, through cooperation with the village LWU representative, or a LWU member might be employed by an NBCA management project.

The Gender Development Unit of DoF and LSFP has been attempting to even the balance. They have focused on training at both central and local level. However, progress has been limited in increasing the number of women in NBCA staffs.

BOX 5: LOCAL WOMEN AND NBCAS

Latsamay Sylavong
IUCN Lao PDR

Most activities of rural households, except for preparing fields for planting and hunting, are women's responsibilities. Observations in Nakai-Nam Theun NBCA show that women's labor contributes most of that needed for gathering fuel wood, food NTFP collection, hoeing and weeding, crop harvesting, transporting and storing crops, livestock raising and meal preparation. Women of the Brou tribe do most of the medicinal herb collection. Consequently, involvement of women's traditional knowledge and experiences are essential for conservation in the future.

Despite this large contribution, rural women are often an "invisible labour force", and have limited participation in development interventions introduced to the village. Decisions on land use and seed selection are often made by men. This is in part because the contact of women with outsiders, and in particular discussions with officials, are not encouraged. For example, women rarely join in meals with outsiders.

Because so much resource use depends on women, to achieve a better future for the rural poor and to improve the environmental conditions, women's participation in development discussions and decisions needs to be encouraged. This must become a high priority among government institutions and development agencies working in protected areas.

3.4.2 Interlevel communication and coordination

Provincial and district governments with other levels

A common problem cited by NBCA Heads is that provincial and district officials do not always consult them before proceeding with development and commercial activities in or near the NBCAs they manage. Such activities include road construction and the commercial removal of natural resources from the NBCA (e.g., Sengsavanh and Evans 1997, FOMACOP 2000c).

Likewise, provincial and district agencies sometimes do not consult DFRC, the national agency with NBCA oversight, before commencing such activities in NBCAs. This is one drawback, amongst many advantages, of GoL policy to delegate authority to the local level. For example, MAF gives annual logging quotas to the provinces, but the province determines where the logs come from. On occasion, some of these logs have come from an NBCA (World Bank 2000). Or a province might bypass MAF and submit a request directly to the Office of the Prime Minister for specific permission to remove a limited number of logs or other resources from an NBCA. Districts have given permits for the removal of rattan by foreign agencies from an NBCA.

This has severe implications for development of participatory conservation with NBCA residents. Government-sanctioned removal of resources from an NBCA will reduce local peoples' respect for the national conservation status of the area. It complicates government managers' efforts to persuade villagers to forego NBCA benefits they now enjoy (e.g., unrestricted hunting) if villagers witness poor government coordination causing damage to the areas.

If plans for development projects that will affect an NBCA originate at the central Vientiane level (e.g., major hydropower projects), then communication is usually better and MAF/DoF/DFRC are frequently (but not always, it should be noted) consulted.

In summary, the provinces and districts sometimes communicate neither up (to DoF/DFRC) or down (to the NBCA Head) about development activities that will affect an NBCA.

DFRC with local levels

On the other hand, provinces, districts and NBCA staff sometimes report that Vientiane does not give them as much guidance and assistance as they would like to manage the National Biodiversity Conservation Areas the central government has designated in the provinces. This is an important role for the central level if the NBCAs are to be managed as a strategic system, as designed (Davey 1998).

Understandably, due to staff and funding limitations it is difficult for DFRC to extend much assistance to the provinces at this time. This has been done mainly through DoF's arrangement of donor projects to help the NBCAs. In addition, DoF and DFRC staff make occasional visits to NBCAs and arrange for local staff to attend protected area workshops and consultations in Vientiane.

It is probably important for DFRC to make more effort to regularly visit the NBCAs, to provide encouragement, demonstrate interest in the NBCA, and a discuss of protected area management issues with staff. Unfortunately, this is difficult for DFRC to do routinely. For example, in the eight years that Phou Dene Din (Phongsaly Province) has been an NBCA (and it may be one of the most important--see Section 3.5), no staff member of DFRC (or its predecessors such as CPAWM) has ever visited the NBCA, except as a counterpart to very brief, donor-organized surveys. This is true of other NBCAs. If the central level, which has the role of providing national leadership, is unable to demonstrate its interest in the fate of an NBCA, perhaps it is not surprising if the province shows little, also. The lack of interest in some provinces in the active management of their NBCAs may be a reflection of limited demonstration of interest by the central level.

Furthermore, provinces, districts and NBCA heads report that they are not always fully aware of DoF/DFRC policies on aspects of protected area management.

Simply delegating responsibility to the provinces and districts is not enough to achieve effective NBCA management. Along with responsibility, NBCA staff need to be given *regular, on-site* guidance, encouragement and supervision. Summoning local staff to Vientiane for workshops has a role to play, but it is not enough. Clearly, given DFRC's staffing and funding limitations, some creative solutions are required to give the provinces, if not money and technicians, at least more guidance and encouragement to manage NBCAs effectively, especially where active donor projects are absent (i.e., the majority of NBCAs in 2001).

3.4.3 Balance of responsibility and authority.

Given the small numbers central and local staff available for the work of protected area conservation, another factor limits their effectiveness: *The responsibility of the institutions trained and designated to manage the NBCAs is not always equivalent to their authority to do so.* This is in part a consequence of the great "power distance" that is often inherent in the institutions of developing countries (Cusworth and Franks 1993).

For any agency to work effectively, the scope of its assigned responsibilities should be about equal to its authority and capacity to fulfill the responsibilities. There is sometimes an imbalance in the two in the management of NBCAs. It is most obvious at two levels:

DFRC

The assigned responsibly of DFRC is to coordinate management of all 20 NBCAs, as well as nationwide wildlife conservation, in one of the most important countries for biodiversity conservation in SE Asia. This is a huge task. Yet DFRC's authority to choose and take action to fulfill this responsibility is limited. DFRC is mainly an implementation and advisory agency for decisions and policy made higher in GoL

Similarly, the main responsibility of DFRC (NBCA management and wildlife conservation) is not consistent with some of the *duties* assigned to it. Even though the capacity of DFRC is already too small for its defined responsibilities, in the past its staff were sometimes assigned duties not directly related to NBCA management or wildlife conservation.

The NBCA Head

Similarly, there is a large difference between the magnitude of an NBCA Head's *responsibility* and the magnitude of his *authority* to fulfill that responsibility (Flint and Chantavong 1998, LSFP *et al*. 1998). An NBCA Head has the task of, in some cases, managing one of the most important protected areas in Asia for the twin objectives of biodiversity conservation and sustainable human livelihoods. Some NBCAs are larger than some districts. Yet, often he is not involved in decisions on issues such as the construction of new roads into the area, or the issuance of permits to extract resources such a logs or rattan. Some NBCA Heads have said that when activities contrary to the objectives of the NBCA occur, they have little authority to object or prevent them.

At both provincial and district levels, technical agencies such as PAFOs and DAFOs (of which the NBCA Head is part) are subordinate to the general civil administration, represented by the provincial and district governors. In some cases, a provincial governor has vetoed NBCA field surveys that had been planned and approved in writing by both DoF and PAFO. In others they have approved removal of timber from protected areas (Claridge 2000).

This arrangement places limits on the power of an NBCA Head. He (there are not yet any women in these positions) is appointed by the PAFO and can expect support from DAFOs within the districts overlapping an NBCA. But he must seek approval from the district governor' s office or PAFO for all major decisions. As noted, the reverse does not apply, however: The NBCA Head is sometimes not even consulted on plans for activities that will affect the protected area. For example, surveys for the construction of a new dam in one NBCA began without consulting the NBCA authorities (LSFP and DoF 2000). In some NBCAs, units of the army or village militia also operate largely independently of the protected area authorities.

3.4.4 Vision and strategy

At present, DFRC, the national organization responsible for coordinating NBCA management, has no strategy for execution of this task. It is especially difficult to conserve the NBCAs as a *system* without clear objectives (Davey 1998). Commendably, DFRC is preparing a strategy at this writing, but until now there has been no prioritization of where to focus management attention, and when. No operational targets or schedules have been set. Management attention has been allocated in an *ad hoc* fashion, driven in part by donor priorities and interests. Consequently, conservation of the NBCA system has probably been less effective and less efficient than it could be. That DFRC is now preparing such a strategy is a good sign for future progress.

3.4.5 Institutional commitment

If one reviews the extensive literature that now exists on NBCAs, it becomes clear that the principal constraint to management progress in some local areas (but certainly not all) is less a shortage of funds, or a shortage of staff, or a shortage of management expertise. It is a shortage of commitment (LSFP *et al.* 1998). The lack of commitment to protecting some NBCAs does not necessarily come from negative attitudes, but from a lack of understanding at some local government levels of the reasons the NBCAs have been established, and why they are important to the nation. The result is easy approval for some activities that damage NBCAs, and less-than full support to management. Until greater commitment to protection of the NBCAs is fostered in some provinces and districts, further investments in management activities will have limited success. This is particularly true in light of the weak position of the NBCA Head.

Many NBCA Heads are dedicated and hard-working, under difficult conditions. They are a bright spot in the NBCA system. Nonetheless, we asked several during the preparation of this report why the NBCA they had responsibility for had been set aside for protection by the government. Most were able to give good answers about the general quality of the area's forest cover, and the significance of its wildlife. Not one, however, knew that their NBCA was selected as a *unique and irreplaceable part of system* of protected areas. They are often told *how* to manage these areas, but less often *why*.

A weakness of the *Manager's Guide to Protected Area Management* is that it devotes hundreds

of pages to explaining the techniques of PA management, but just four paragraphs to why PAs are important generally, and none to why *Lao NBCAs* are significant and should be protected. Yet understanding this is a prerequisite to good, dedicated management.

Staff limitations place a significant constraint on NBCA management at the local level (Saphanthong 2000). However, not all shortages of NBCA staff are due solely to shortages of people. DoF has made the important point that increasing staff *numbers* will not improve NBCA management unless the staff work in the field, with villagers (LSFP and DoF 2000). There is also an issue of the priority of NBCA management has at the local level. A few provinces are waiting, inactive, for an NBCA donor project to arrive. Until then, they attempt little on their own. For example, one head of Provincial Forestry Office reported that he has at his disposal almost 60 provincial and district staff, but not one is assigned to a large NBCA in the province. His explanation was that there was no donor yet, no money for management of the NBCA. Yet little money is needed to assign one staff member out of 60 (less than 2% of available Forestry staff for an area that covers approximately 1/3 of the province's forest and its most important watershed) to walk into the NBCA and begin discussions with residents about the area, their patterns of resource use, and so forth.

The attitude at the local level is sometimes one of *lack* (which can be reinforced by donors). That is, that management cannot begin because of a lack of staff and funds. But we suggest that ***some*** management progress could made if the attitude was simply shifted to one of *abundance*, e.g.: 'We have 60 staff, a comprehensive *Protected Area's Manager's Guide* provided by DFRC, and an abundance of conservation posters, cassette tapes and booklets provided by DFRC. Let's see how we can use these resources to begin the work of conservation in the NBCA.'

> ***"Progress [in protected area management] does not necessarily depend on 'grand solutions', but rather on moving ahead step by step with the means available."*** **(McNeely 2000*).***

3.4.6 Options to improve institutional arrangements

Improving interlevel coordination

The *Review of Conservation Management in the Lao P.D.R.* (LSFP *et al*. 1998) made detailed suggestions to improve coordination of NBCA management among all levels of government. The report identified greater central level guidance and supervision of local implementation as a key need. Suggestions included that DFRC representatives be appointed managers of the NBCAs. Some similar recommendations were made by Marsh (1999).

Such suggestions, however, are for the long-term. They would require a significant expansion of trained, human resources in DFRC. This is truer today than when the 1998 *Review* was prepared, since DFRC now has fewer staff. Nonetheless, we agree that increased guidance and assistance from the central level would improve local effectiveness. It is probably the most important institutional measure needed for improved NBCA management. But clearly, other, less ambitious means are needed for the near-term.

Below we outline other options that are more modest. They could be implemented with only a moderate addition to the human and financial resources at hand. They could be viewed as substitutes for the recommendations of the *Review* or, perhaps better, as interim steps in a process toward the more ambitious recommendations of the *Review*.

Three observations influenced the options suggested:

1. It is not enough to delegate responsibility and provide written guidelines for NBCA management to the local level. If these are to be translated into excellent NBCA management it is also necessary to send regular encouragement and guidance, *especially* to new NBCA Heads (Sengsavanh and Evans 1997).

2. It is DoF policy to send central staff to assist with policy implementation at the local level.
3. The NBCAs comprise a system, and therefore need to be managed in a coordinated way.

Option 1: *Appoint one or more DFRC staff as full-time NBCA liaison officers.*

One or more senior DFRC staff could be assigned the sole task of regularly visiting each NBCA, from a base in Vientiane. He or she could alternate 2-3 weeks visiting NBCAs with 2-3 weeks in Vientiane. Under such a schedule, DFRC would be assured of visiting every NBCA at least 2-3 times per year. This should improve coordination between the local and central level, and provide encouragement and leadership to NBCA staff. Frequency of the visits could be increased (and the burdens of travel eased) if the job was shared by two people. Clearly, the right person is needed. He or she should hold a senior position in DFRC, and should have training and experience in protected area management.

Alternatively, the periodic visits could be divided amongst DFRC technical staff according to the donor NBCA projects they have been assigned to coordinate. A weakness of this approach is that some technical staff are too junior to meet easily with higher district or provincial officials. Another is that not all NBCAs have donor projects (and for just that reason may be the most important ones for DFRC to visit).

Option 2: *Assign responsibility to three DFRC staff for NBCA oversight in each of three regions: north, center and south*.

Alternatively, DFRC could assign one staff member oversight responsibility for all NBCAs in one region of the country. The regional coordinators should spend at least half their time in their assigned regions (probably based at the PAFO most central to the region), and the remainder in Vientiane. The regions could be divided as follows, as one example:

REGION	NBCAs	BASE	COMMENTS
North	LNT NET NPY NXM PPD PLY	Louang Prabang	• Although Louang Prabang Province contains only a small part of one NBCA, all NBCAs in the region can be reached by road in less than one day from Louang Prabang town. • Good communication links with, and air and road access to, Vientiane.
Central	HNN NKD NNT PHP PKK PPN	Thakhek	• Khammouane Province (of which Thakhek is the capital), contains most of the region's NBCAs. • Most coordination effort probably needed in NNT (due to its importance, and possible NT2 construction), which is close to Thakhek • all the region's NBCAs can be reached in less than half a day's drive from Thakhek, except PPN, which is close to Vientiane. • Good communication links with, and easy road access to, Vientiane
South	DAP DHS DPV PXH PXT XBN XPN XXP	Pakxe, or Savannakhet	• Access to NBCAs and communication links about the same for P. or S. • Pakxe has the advantage of being close to XPN, one of the most important NBCAs

The point might be advanced that regional DFRC coordinators are not necessary because the PAFO already serves the role of DoF representative at the local level. However, in general PAFO staff are less suitable for this role than DFRC staff:

- they rarely have specialized training in protected area management;
- they do not have the national perspective of the NBCAs as an integrated system;
- they are not from the central level, and so cannot serve to demonstrate the central level's interest in and commitment to the NBCAs.

- 14 provinces have NBCAs in them; it is more difficult for DFRC to coordinate with 14 PAFOs than with three regional coordinators.

Establishing the regional coordinators would require some investment, either by GoL or from a donor. The liaison officers or regional coordinators would need a four-wheel drive vehicle and a budget for fuel. It is imperative that the right, energetic people be chosen for the job, and that they are properly trained. They need to know more (or at least as much) about PA management than the NBCA Heads they will be asked to supervise. This may require some investment in training.

The goal of Option 1 or 2 is the same: to increase coordination of, and local commitment to, NBCA management. The duties of the liaison officers or regional NBCA coordinators would include:

- Periodically and *regularly* visit NBCAs to:
  - provide technical assistance, advice and encouragement
  - assist NBCA staff to prepare management plans consistent with MAF/DoF policies
  - see that NBCA staff understand details of MAF/DoF policy on such issues as land allocation, NBCA boundary demarcation, etc.
  - demonstrate the central level's interest in the NBCA
  - serve as a general communication link between the NBCA and DFRC/DoF
  - be an ear for the problems, and success stories, of the NBCA Head
  - Provide extra supervision and support to new NBCA Heads;
  - Monitor and supervise NBCA donor projects in the field.

- Periodically visit the relevant DAFOs and district governor's offices, for many of the same reasons listed above and, most importantly, to discuss any district plans for development activities that might affect an NBCA.

Potential benefits include:

- Improved coordination of staff training, the transfer of lessons learned, and landscape-level conservation;
- Advancement of DoF policy to send central-level staff to assist the local level;
- Increased consistency of management from NBCA to NBCA;
- Improved dissemination to NBCAs of DoF/DFRC policies, technical assistance and services;
- Improved alignment of NBCA management with MAF/DoF policies (on issues such as ecotourism);
- Improved morale of NBCA staff, and therefore improved job performance;
- Closer monitoring of local development activities that might affect NBCAs;
- Better information for DFRC and DoF on the state of NBCAs and their management;
- Cost savings:
  - it is cheaper to consult with 3 regional coordinators in Vientiane than 20 NBCA Heads;
  - it is more efficient, and therefore cheaper, to coordinate regional training of NBCA staff, than to do it NBCA-by-NBCA;
  - it is cheaper to give conservation posters, training manuals, etc. to one regional coordinator to distribute to NBCAs, than to send them to several provinces.

Improving distribution of responsibility and authority

The *Review of Conservation Management* (LSFP *et al*. 1998) noted in detail the need to elevate the position of the NBCA Head within the government hierarchy. Observations made during the preparation of this report concur. At the very least, the position needs to be raised to a stature that allows the NBCA Head to confer routinely and comfortably with district governors and the district planning committees

Improving gender balance

- Routinely include local representatives of the Lao Women's Union in NBCA projects;
- Develop women-only field training courses at central and local levels, with female trainers whenever possible. This will make it necessary for both provinces/districts and DFRC to supply women for training in NBCA work, and stimulate them to pay attention to the issue. It will also avoid the tendency for female participants to become subordinate to male classmates in field courses.

Improving institutional commitment

In the future, more attention should be focused on teaching local NBCA staff *why* their NBCA should be managed, and not just *how* to do it. This is especially important in the Lao context, where local staff are expected to manage NBCAs with little direct involvement of the central level. Without understanding why an NBCA should be protected, staff are unlikely to make best use of the 'how' tools taught to them (survey techniques, mapping skills, etc.).

One option that might help is preparation of a Lao-language booklet with the following:

- An explanation of why the NBCAs were established, according to the Forestry Law;
- An explanation of how the NBCAs were selected, according to biogeographic criteria;
- A section on each NBCA explaining its unique and irreplaceable contribution to the national protected area system.

The updated *Fact Sheets* for NBCAs contain some of this information already. But the issue is sufficiently important that a specific, supplementary publication of this type is warranted.

In addition, appointing DFRC staff as full-time NBCA liaison officers or regional coordinators (above) would increase the demonstration of central-level commitment to NBCA conservation, which should translate into increased local commitment.

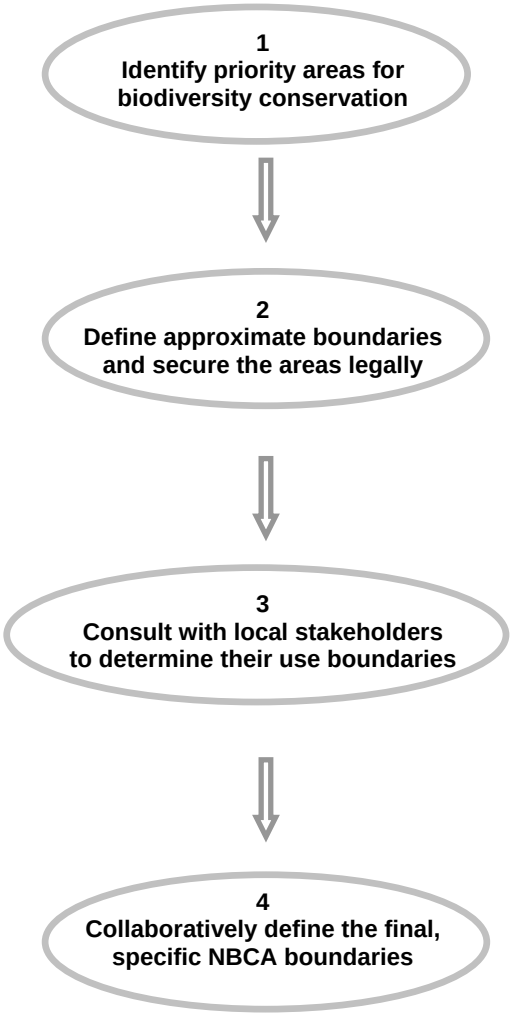
3.5 SYSTEM DESIGN

3.5.1 Introduction

The following sections discuss aspects of the biogeography of the NBCA system. Another important aspect of protected area design is *process*. Of key concern is how many local stakeholders groups, especially villagers, are involved in demarcating the protected area boundaries.

In the Lao case, consultation with local residents was weak in the NBCA selection process. While the original survey team traveled widely and visited many villages in the course of reconnaissance surveys during the system's planning phase, little consideration was given to specific, existing local land use claims when the proposed boundaries of the areas were drawn. The boundaries of the NBCAs were decided almost exclusively on biogeographic criteria (although a general effort was made to avoid areas of dense human population).

This was not necessarily a mistake, for two reasons. First, meaningful collaboration with local residents of all twenty areas would have delayed by years legal recognition of the system. Second, the precise boundaries of the NBCAs are not fixed, and can now be refined with local input (see Section 2.7, *Opportunities*). The planning effort fulfilled its tasks well: identification of areas that, as a system, make the best contribution to the conservation of Laos's biodiversity, and suggestions for their approximate boundaries. It can be viewed as just the first two steps in a four-step process:



The final two steps now need to be finished and, in fact, have been started by several of the NBCA management projects.

3.5.2 Subunit and habitat coverage

As noted earlier, the NBCAs comprise a *system* strategically designed to conserve up to 20% (and at least 5%) of the estimated original extent of each major habitat type in each of Laos's biogeographic subunits (as defined by MacKinnon and MacKinnon 1986). The major habitats defined were four forest types:

- Evergreen Forest (EVF)
- Mixed Deciduous Forest (MDF)
- Conifer-Mixed Conifer Forest (CMCF)
- Dry Dipterocarp Forest (DDF)

Berkmüller *et al.* (1995a) concluded that the newly established NBCA system had accomplished much of the minimum level requirements, with a few gaps. MacKinnon (1997) later made minor revisions to the sub-units for Laos. Annex 4 includes a discussion of the appropriateness of the revisions for Laos.

Since Berkmüller *et al.*'s analysis, two new NBCAs have been gazetted (Dong Phou Vieng and Xe Xap), large extensions were added to Nam Ha NBCA, and a large corridor established between NNT and PHP. This has made modest increases to the system in EVF, MDF and CMCF. Little or no increase in DDF has resulted. MDF remains the only forest type that is well represented in the NBCA system compared to estimated original extents. The following

discussions concern coverage of the other three forest types, and other habitats not heretofore considered:

EVF:
Biodiversity tends to be highest in EVF than any of the other three types. However, there is limited opportunity to increase this important component in the NBCA system. Most EVF forest has already been lost from Laos, especially in lowland areas (principally Subunit 10a). If *all* proposed NBCAs were gazetted, this would increase the representation of original extent of EVF in the NBCA system from about 6% to at most about 8.3% (Berkmüller *et al.*) Viewed in a more positive light, it would increase the area of EVF protected in NBCAs by more than 20%.

CMCF:
The conifer habitats of Laos are of significant biological importance. Since Berkmüller's analysis, some CMCF has been added to the NBCA system with the gazettement of Xe Xap NBCA. Unfortunately, even more has been lost, due primarily to the logging of pine from a proposed reservoir zone on the Nakai Plateau. Some has also been lost to conifer logging in Nam Xam NBCA, from a concession granted before the NBCA system was established but harvested in the years after (Showler *et al.* 1998).

DDF
The only NBCA with large tracts of lowland dry dipterocarp forest is XPN. Biologists differ over the urgency of adding more of this otherwise important habitat to the Lao NBCA system. Some note that DDF is far more widespread in neighboring northern Cambodia, and Lao should concentrate on conserving its forests of regional importance: montane EVF. Others note that DDF is not well protected in Cambodia, logging is widespread there and Laos, indeed, can make a contribution to safeguarding this resource.

Limestone karst
Limestone karst is not a forest type, and so was not analyzed by Berkmüller. The most significant and important blocks of karst in Laos are already contained within two NBCAs, PHP and HNN. There are other scattered blocks throughout the country (e.g., north of Vientiane in the Vang Vieng area), but none suitable for inclusion in an NBCA.

Wetlands
Wetlands are generally recognized as the most important under-represented habitat in the NBCA system. While one type of aquatic habitat, montane streams, is fairly well represented, here we consider the more usual notion of wetlands--naturally slow moving or still, shallow aquatic systems, usually on poorly drained soils. By far the most extensive wetlands are found in XPN NBCA. Others occur in NNT, DHS, XBN and DAP.

Where wetlands remain they are very important to Lao people, particularly for the harvest of fish and other sources of protein (Claridge 1995). They are also important biologically, supporting unique communities, including some highly threatened species that are absent from forests, e.g., Siamese Crocodiles and large waterbirds.

A highly threatened wetland type within NBCAs is large slow-flowing tributaries of the Mekong River. The few that exist in Laos are under pressure from existing and planned hydropower development.

The most important Lao wetland that is not significantly represented in the NBCA system is the Mekong River itself. A border of one NBCA, PXT, runs along the Mekong, but there is little management focus on the river itself, in part because it is an international border (with Thailand). The ecoregion analysis coordinated by WWF rates the Mekong one of the most significant ecosystems for conservation in Indochina, supporting high fish diversity and a number birds specialized to large rivers (Baltzer *et al*. in prep.). Hydropower pressure on other

Lao rivers heightens the conservation importance of the Mekong.

Reasons more wetlands were not included in the Lao NBCA system

***Topography*: Laos is mostly mountainous, and so wetlands are naturally limited in extent.**

***Cultural history*: The largest ethnic group of Laos are the Tai-Kadai, lowland cultivators of paddy rice. Consequently, over the centuries most wetlands of the Mekong Plain have been converted to rice paddies.**

***Technological limitations*: When the NBCA system was designed in the late 1980s/early 1990s, means were not available to DoF to accurately discern wetlands from remotely sensed data.**

***Institutional bias*: NBCAs are managed by the Department of Forestry, and all NBCAs are classified as "Conservation Forests". Consequently, there was some bias towards forests in the selection of NBCAs, at the expense of open habitats.**

3.5.3 NBCA prioritization

Ranking the importance of protected areas and identifying their management priority entails risk. While calling attention to important areas, it could simultaneously leave the impression that areas with lower rankings are expendable. In the case of the Lao NBCAs this would be incorrect. The NBCAs together are an integrated conservation *system*, analogous to a human body. While the brain and heart might be considered the most 'important' organs, we can't do away with our kidneys and liver and maintain good health.

Nonetheless, human, financial and political resources for conservation are limited (though not fixed). Reluctance to identify where investment of these resources would give the best return in conservation value does a disservice to government, donors and the conservation endeavor.

Biodiversity value

We generated rankings of the intrinsic value of each NBCA according to its contribution to the NBCA system's main objective, biodiversity conservation.

There have been two NBCA prioritization exercises to date. Berkmüller *et al.* (1995a) scored and ranked existing and proposed NBCAs according to three aspects of their forest cover: extent, quality, and the significance of its representation in its biogeographic sub-unit. They acknowledged that the method underweighted NBCAs with important habitats that are not densely forested, principally limestone karst, open dipterocarp forest, and wetlands.

In another important exercise, Ling (1999) ordered the NBCAs using a complementarity algorithm based on presence of birds and mammals. Complementarity is a step-wise analysis that picks the most diverse site first, and then selects subsequent sites, one at a time, that add the most *new* diversity to the set of sites picked before it. The goal is to maximize the diversity of the *system*. Therefore, once the first site is identified, remaining sites that are most diverse individually are not necessarily ranked highest.

Ling analyzed existing and proposed NBCAs for which there was sufficient data based on two criteria: First, all bird species, as an index of general biodiversity; second, species of conservation concern ("key species") of birds and mammals, as an index of the conservation importance of each area's diversity.

In one sense the habitat rankings of Berkmüller were also a complementarity exercise. The ranked value of an area did not depend solely on the size and quality of its forest, but on the contribution it makes to coverage goals in its particular sub-unit. Therefore, a relatively small and degraded NBCA could score high if it is the only NBCA in its sub-unit.

One weakness shared by both analyses is the absence of a regional or international context. For example, in the species complementarity analyses, animals rare in Laos but more common elsewhere (e.g., Gaur) were not distinguished from species endemic or near-endemic to Laos (e.g., Saola). In the forest rankings, one of Laos's most distinctive habitats, forest on limestone karst, was not differentially weighted. Given equal diversity, NBCAs that harbor species and habitats rare elsewhere in the world are arguably of higher conservation importance than NBCAs which do not.

To overcome this weakness, we augmented the results of the two studies with the ecoregion analysis recently coordinated by WWF, combining all three to yield a broader-based assessment. Because the conclusions remain somewhat subjective, and would probably change if other criteria such as plant diversity were considered, absolute rankings are not appropriate. Instead, the NBCAs were grouped into three levels of biodiversity significance. These are shown in Table 7. The areas of "highest" significance in Table 7 were identified on the basis of being highlighted in all or most of the three analyses considered. Table 8 summarizes the justification for the selection of each.

If the importance of Lao NBCAs is considered ***exclusively in an international context*** and not as a national system, priorities change. That is, if Lao PDR focuses on conserving its ecosystems that are most distinctive and limited in a global context, then "Highest" priority are the Annamite Mountain NBCAs (and NBCAs of the associated limestone block): **DAP, HNN, NNT, PHP,** and XXP; and lowland evergreen forest: **XPN**.

Table 7: Biodiversity significance of NBCAs.
NBCAs are listed alphabetically within each group.

Highest[1]	High	Moderate
(HNN-PHP)[2] (NET/PLY[3]-NHA-PDD) NNT XPN XXP	DAP DHS DPV NKD NPY PXH	NXM PKK PPN PXT XBN

[1] Almost all NBCAs were gazetted because they have significant biodiversity value. Therefore, the categories "highest", "high" and "moderate" are more appropriate than the more standard 'high', 'mid' and 'low'. No NBCAs in Laos have 'low' biodiversity value.
[2]Closely similar NBCAs are grouped together. It is difficult to say which is more important, but if one of the group is conserved to a high standard, urgency for conserving the others drops somewhat in the context of the NBCAs as a system.
[3]The contiguous NBCAs NET and PLY are treated as one, which reflects their treatment in management planning.

Table 8: Selection criteria for the NBCAs of "Highest" biodiversity significance.

NBCA	Forest Cover (Berkmüller *et al.* 1995a)	Species Complementarity (Ling 1999)	Ecoregion Analysis (Baltzer *et al.* in prep.)	Other
HNN	[modest ranking due to extensive limestone karst]	HNN 3rd to 4th highest selection for confirmed and all key mammals	-Central Indochina Limestone: FLMEC "Critical". -Active Mekong Limestone: FLMEC "Highest" for freshwater biodiversity importance	-Endemic Bird Area (Stattersfield *et al. 1998*; J. Tordoff, BirdLife International, pers. comm.*)* -"globally significant" (MacKinnon 1997)
NET/ PLY	both rank 4th (tied)	-PLY 5th highest for all birds; -In absence of PLY, NET would rank similarly	[outside FLMEC - not analyzed]	
NHA	adjusted for recent extensions, would rank in top 5, at least.	-3rd for all birds -5th for all key mammals	[outside FLMEC - not analyzed]	
NNT	ranks 1st of all NBCA	-1st or 2nd selection ranking for all criteria; -"NNT clearly emerges as the lynch-pin of the Lao protected areas network..."	-Northern Annamites: FLMEC "Critical" [1] -Active Mekong Limestone: FLMEC "Highest" for freshwater biodiversity importance[2]	-"globally significant" (MacKinnon 1997) -only NBCA in Laos that harbors Saola
PDD	ranks 2nd	[insufficient data]	[outside FLMEC - not analyzed]	
PHP	[modest ranking due to extensive limestone karst]	similar importance to HNN	-Central Indochina Limestone: FLMEC "Critical". -Active Mekong Limestone: FLMEC "Highest" for freshwater biodiversity importance	-Endemic Bird Area (Stattersfield *et al.* 1998; J. Tordoff, BirdLife International, pers. comm.*)* -"globally significant" (MacKinnon 1997)
XPN	ranks 4th (tied), despite extensive natural open habitat	1st or 2nd for birds and key birds	Cambodia/Laos/Vietnam Tri-border Forests: FLMEC "Acute"	"globally significant" (MacKinnon 1997)
XXP	ranks 3rd	[insufficient data]	Central Annamites: FLMEC "Critical"	

[1] WWF's FLMEC report identified the most important terrestrial habitats for conservation and ranked them as (in descending order): "Critical", "Acute", "High".
[2] FLMEC important freshwater habitats were identified and ranked as: "Highest", "High", "Moderate".

Management priority

To determine the management priority of each NBCA, we first supplemented the NBCAs biodiversity value rankings with assessments of two other important attributes, their watershed values and their ecotourism potential.

Watershed values

Watershed values are generally highest for large NBCAs on steep, forested land that forms the headwaters of major rivers. The presence of downstream hydropower dams or major irrigation schemes adds value. Also considered was the importance of the fishery maintained by the watershed. In consultation with topographic maps, maps of existing and proposed hydropower projects, and proposed lowland agricultural development zones, NBCAs were assigned to one of three categories based on watershed importance, ""high", "mid" or "low".

Ecotourism potential

The ecotourism potential of each NBCA was ranked 'high", "mid" or "low" based on the following four criteria:

- *Attractiveness*: This a function largely of an area's scenic beauty, the distinctiveness of its animals and plants, and the distinctiveness, diversity and integrity of its traditional cultures.
- *Access and security*: An area's potential for ecotourism development is influenced by its proximity to other major tourist destinations and transit routes, and its safety.
- *Existing plans*: We considered if the area already has an ecotourism operation, or if one is planned.
- *Sensitivity*: Some areas that meet the above criteria may not be suitable for ecotourism due to the sensitivity of its habitats and wildlife to disturbance from tourism.

Management priority is a function not only of an area's importance, but also the level of pressure on it. The major pressures on NBCAs, and the indicators used to assess their significance, are:

- Poaching and wildlife trade pressure.
  Indicator: NBCA's proximity to major towns, all-weather roads, and/or an unguarded international land border.

- Subsistence pressure on resources from local residents.
  Indicator: Density of villages in the NBCA.

- Infrastructure development and commercial timber harvests:
  Indicator: Existing or planned dams, roads, quarries, or timber harvests.

In some cases, factors other than those above were considered, e.g., the tremendous pressure on DHS for conversion to coffee plantations. Using these factors, the NBCAs were grouped according to the degree of pressure on them ("high", "mid", "low"). Groupings closely match those of Ling (1999), with a few adjustments based on additional information.

Table 9 shows NBCA rankings for biodiversity value, watershed value, ecotourism value and pressure level.

Finally, we combined an NBCA's value and pressure rankings to generated a 'Management Priority Score' for each. This was done by assigning numerical values to the qualitative value and pressure rankings, as follows, and summing them for each NBCA:

Biodiversity Value Highest: 5 Highest-High: 4 High: 3 Moderate: 2	"Highest-High" was reserved for the cluster of northern NBCAs, NET/PLY-NHA-PDD. The biodiversity they represent as a group are of highest conservation value, but it is not possible to determine with current data which site the most important.
Watershed Value High: 3 Mid: 2 Low: 1	The range of values is lower than for Biodiversity Value, because the NBCAs were selected and decreed mainly for conservation of biodiversity, not watersheds.
Ecotourism Value High: 2 Mid: 1 Low: 0	The range for ecotourism is lower than for Watershed Value because it is probably less important. Ecotourism mainly represents potential, unrealized value, while the watershed values of NBCAs are functioning at this moment, 24 hours/day.

Pressure Level
High: 3
Mid: 2
Low: 1

The range is set in the middle, less than Biodiversity Value, in realization that all NBCAs in Laos are under significant pressures. First priority is to secure the highest biodiversity value sites, and secondarily to consider which sites are under greatest pressure.

The last column in Table 9 shows each NBCA's 'Management Priority Score', obtained by adding the point values, above, for each of its rankings. NNT stands out as the NBCA of highest overall priority for management, with XPN second.

Table 9. Intrinsic NBCA values, level of pressure and management priority.
NBCAs are listed alphabetically within each Biodiversity Value category.
See text for details of scoring criteria.
Note: Data on all NBCAs are incomplete. The assessments and scores in Table 9 are an approximate guide only. Revision will probably be necessary as the data set increases.

NBCA	Biodiversity Value	Watershed Value	Ecotourism Value	Pressure Level	Mgt. Priority Score
HNN	Highest	Low	Low	High	9
NNT	Highest	High	High	High	13
PHP	Highest	Low	High	High	11
XPN	Highest	High	High	Mid	12
XXP	Highest	Mid	Low	Mid	9
NET/PLY	Highest-High	High	Mid	High	11
NHA	Highest-High	High	High	Mid	11
PDD	Highest-High	Mid	Mid	High	10
DAP	High	High	Low	High	9
DHS	High	Mid	High	High	10
DPV	High[1]	Mid	Low	Mid	7
NKD	High	Mid	Low	Low	6
NPY	High	Mid	Low	Mid	7
PXH	High	High	Mid	Mid	9
NXM	High	Low	Low	High	7
PKK	Moderate	Mid	High	Mid	8
PPN	Moderate	Mid	Low	Mid	6
PXT	Moderate	Low	Low	Mid	5[2]
XBN	Moderate	Mid	Low	High	7

[1] The biodiversity importance of DPV may be higher. Information on birds and some other key taxa is limited, the vegetation is distinctive, and it is known to have the highest fish diversity of any NBCA surveyed (I. Baird 1998).
[2] The management priority of PXT might be higher, since it is the only NBCA along the Mekong River, an FLMEC habitat of "Critical" importance.

3.5.4 Status of proposed additions to the NBCA system

Berkmüller *et al.* (1995a) proposed 11 new NBCAs or major extensions to existing NBCAs. Since then, the following actions have been taken:

Nakai-Nam Theun Extension	Gazetted in 2000 by Bolikhamxay Province as the "Nam Chat/Nam Pan Provincial Conservation Forest"
Nam Theun Corridor	Gazetted in 2000 by Prime Minister's Office
Nam Ha (west)	Added to Nam Ha NBCA by Prime Minister's Office in 1999
Xe Xap	Gazetted in 1995 by Prime Minister's Office

It is not clear if the Nam Theun Corridor will be administered as part of NNT, or PHP (to which it joins), or as a separate NBCA. The first is most likely.

Some other additions not recommended by Berkmüller *et al*. have been made to the system. They are:

- a small corridor linking the southern end of NNT with the northern end of HNN (see Figure 1)
- DPV NBCA
- Nam Kong Provincial Conservation Forest added to NHA NBCA

No action has been taken on the other seven sites recommended by Berkmüller *et al*.:

Nam Kan	Bokeo Province
Nam Chouan	Bolikhamxay Province
Bolavens Northeast Bolavens Southwest Phou Kathong Phou Theung Xe Khampho	contiguous southern provinces of Attapeu, Champasak, Salavanh, Xekong

The Dong Kanthoung area in Champasak Province has also been widely recommended as an NBCA (Berkmüller and Wannalath 1996, Timmins and Vongkhamheng 1996, Round 1998), but no legal action has been taken.

3.5.5 Options to improve system coverage

Following are the principal options to increase coverage of the habitats that have relatively limited representation in the current NBCA system:

Habitat Type	**Best Options**
Evergreen Forest (EVF)	NBCA gazettement of (in alphabetical order): • Dong Kanthoung • Nam Chat/Nam Pan Provincial CF • Nam Chouan • Nam Kan • [Phou Theung?] • [Xe Khampho?]
Conifer Mixed Conifer Forest (CMCF)	Protect remaining Nakai Plateau pine stands above the NT2 dam inundation zone; NBCA gazettement of: • Nam Chouan • Nam Chat/Nam Pan Provincial CF
Dry Dipterocarp Forest (DDF)	NBCA gazettement of Dong Kanthoung
Wetlands	NBCA gazettement of: • Dong Kanthoung • Xe Khampho? • a stretch of the Mekong River

The above is a list of options only. It is unlikely all could, or should, be gazetted as NBCAs. If, however, some new areas are eventually added to the system, the following five are probably most important and should be considered first. All have higher biodiversity value than many of the twenty existing NBCAs.

Dong Kanthoung
- Northern Plains Dry Forest: FLMEC "Critical" (Baltzer *et al*. in prep.)
- "...the best and most extensive level lowland Semi-evergreen or Evergreen Forest (SEF/EF) remaining in Lao." (Timmins and Vongkhamheng 1996)
- 2nd to 3rd highest complementarity rank of all existing or proposed NBCAs for key birds and mammals (Ling 1999)
- most important wetlands of any proposed NBCA

Nam Chat/Nam Pan Provincial Conservation Forest (formerly called "Proposed Nakai-Nam Theun Extension"):
- Northern Annamites: FLMEC "Critical" (Baltzer *et al*. in prep.)
- one of only seven existing or proposed NBCAs ranked "globally significant" (MacKinnon 1997)
- important "everwet" evergreen forest habitat
- important populations of Annamite endemics such as Saola

Nam Chouan
- Northern Annamites: FLMEC "Critical" (Baltzer *et al*. in prep.)
- one of only seven existing or proposed NBCAs ranked "globally significant" (MacKinnon 1997)
- highest forest quality rank of all proposed NBCAs (Berkmüller *et al*. 1995a)
- highest species complementarity rank of all proposed NBCAs (Ling 1999)
- likely to have important populations of Annamite endemics such as Saola

Mekong River
- FLMEC "Critical" (Baltzer *et al*. in prep.)

Laos has good potential to conserve some parts of the Mekong River, because there are long stretches, both north and south, which are Lao territory on both banks. Another possibility is a transboundary reserve of a stretch of the river shared with Thailand. If human access were restricted in the river reserve, Laos's border security would also benefit.

Xe Khampho (?)
This area adjacent to Xe Pian NBCA reportedly has high quality forest and rich populations of wildlife--probably of higher significance than in many parts of XPN itself (I. Baird, pers. comm.)

GoL has already dedicated 12-14% of the nation's land area to the NBCA system. It is unlikely that coverage will be significantly increased anytime soon. One option to adding more NBCAs and more area to the NBCA system is to *exchange* some of the priority proposed areas for gazetted NBCAs of lesser value. That is, some new areas could be gazetted, while existing ones were de-gazetted to provincial conservation forests or other classes of forest. This could improve the quality of the NBCA system while keeping its number of sites and/or its land area constant.

3.6 MANAGEMENT

3.6.1 Management progress

The World Commission on Protected Areas (WCPA) has developed criteria and a score sheet to measure the management status of a protected area (Hocking *et al.* 2000). We adapted them for the Lao context, selecting 12 management topics on which each NBCA was scored 0,1,2 or 3 (basically, 'poor' to 'excellent' progress). Topics and their scoring criteria are shown in Table 10.

Each NBCA was scored for each topic based on published information, interviews with NBCA staff and conservation advisers, and personal observations. The 12 scores were totaled for each NBCA, then expressed as a percentage of the maximum possible score (36 = 3x12) achievable by some mythical, perfectly managed protected area. Conceptually, the percentage score is an index of how far along a NBCA is to excellent conservation management. It could be considered a 'Management Progress Index'. Table 11 shows the results for each NBCA.

The point of the exercise is **not** to compare the NBCAs of Laos to protected areas in other countries. If Yellowstone National Park, a protected area with more than 100 years of management in the world's wealthiest country, scores higher than a Lao NBCA, that contributes little information of value to Lao protected area management. Rather, two reasons for conducting the exercise are:

3. To compare the NBCAs to one another in 2001 so that management gaps can be identified.
4. To allow comparison of an NBCA in 2001 to itself again in a few years, when the exercise could be repeated. It is a tool to monitor management progress and the effectiveness of donor assistance.

Results from Table 11 indicate that none of the Lao NBCAs are what could be considered more than half-way to effective management (i.e., no progress indices are above .50). This is not surprising, given the youth of the system. The most consistent management strength is Information, i.e., the quality of biodiversity and socio-economic information available for developing management strategy. The most consistent weakness is Information Management and Monitoring.

For four NBCAs, HNN, NHA, XBN and XPN, the rigor of the management progress analysis (Tables 10 and 11) was tested by having three people score the NBCAs independently. They were:

- **the NBCA Head**
- **the foreign conservation adviser to the NBCA**
- **the authors of this report, based on published information and interviews.**

The scores were:

	HNN	NHA	XBN	XPN
NBCA Head	**.27**	**.50**	**.56**	**.50**
NBCA Adviser	**.39**	**.33**	**.33**	**.53**
Outside Reviewer	**.36**	**.33**	**.31**	**.50**

The scores are very similar for XPN, and fairly so for HNN. NHA was something of a test--the scoring forms in English were given to the NBCA Head (whose English is reasonably good) with little explanation. He may have had trouble understanding the text, or he may have interpreted the exercise as an evaluation of his personal performance. This indicates that for future use the forms should be translated into Lao and a standard protocol for completing them developed.

Table 10: Topics and criteria for scoring NBCA management progress.
Adapted from Hocking *et al.* (2000).

TOPIC	CRITERIA	SCORE
LAW		
1. Legislation	a. There is no legal basis for protection of the area.	0
	b. There is legal basis for protection of the area, but problems with legislation or its understanding are a significant barrier to management.	1
	c. Problems with protected area legislation or regulations and their understanding are not a significant barrier to management.	2
	d. Legislation and regulations are highly effective in supporting management.	3
2. Boundary Demarcation	a. There is no legally defined boundary for the protected area.	0
	b. The protected area's boundary is legally defined, but is inexact and/or it is not visible on the ground.	1
	c. The protected area's boundary is legally defined, but it is only partially and/or temporarily marked on the ground, and not all local stakeholders know where it is.	2
	d. The protected area's boundary is permanently and fully marked on the ground, and most local stakeholders understand where it is.	3
3. Enforcement	a. There is no enforcement of protected area legislation and regulations.	0
	b. There are major deficiencies in enforcement (e.g., unclear understanding of the law, small and/or poorly trained staff, problems with legal process).	1
	c. Enforcement is active, but some deficiencies remain.	2
	d. Enforcement of legislation and regulations is excellent.	3
MANAGEMENT		
4. Objectives	a. The main objective of the area and its management is not biodiversity and habitat conservation.	0
	b. The main objective of the area and its management is biodiversity and habitat conservation, but significant new development or other activities contrary to this are allowed or planned (e.g., infrastructure construction, logging, etc.).	1
	c. The main objective of the area and its management is biodiversity and habitat conservation, and only limited new development or other activities contrary to this are allowed or planned.	2
	d. The principal objective of the area and its management is biodiversity and habitat conservation, and no new development or other activities contrary to this are allowed.	3
5. Funding	a. Little or no funding is committed to management of the protected area.	0
	b. Partial funding flows to management of the area, but the scope is not sufficient for effective, long-term conservation (e.g., amount is too small and/or duration is too limited).	1
	c. There is significant, long-term funding ($\geq$ 20 years; e.g., recurring government budget line, donor commitment, or trust fund), but not enough for implementation of some management objectives.	2
	d. The protected area is fully funded for effective, long-term conservation.	3
6. Information gathering	a. There is almost no information on the area's biodiversity and the socio-economics of local human residents.	0
	b. There is some information on the area's biodiversity and socio-economics, but not enough to contribute to a management strategy.	1
	c. There is enough information on the area's biodiversity and socio-economics to prepare a basic management strategy.	2
	d. Information on the area is excellent, and sufficient for preparation of a comprehensive management strategy.	3
7. Planning	a. There is no written management strategy for the protected area.	0
	b. A management strategy is under preparation, or one has been written but has not been approved by all required levels of government, and implementation is minimal.	1
	c. A management strategy has been approved, but there is not yet full implementation (due to funding or staff constraints, for example)	2
	d. An approved management strategy is under full implementation.	3

8. Staffing	a. No full-time staff are assigned to the protected area.	0
	b. Staff are assigned to the area, but their numbers and/or training & experience fall significantly short of that needed for successful management.	1
	c. There are staff assigned to the area, and numbers and training are sufficient for implementation of most, but not all, management.	2
	d. The protected area is fully staffed with adequately trained and motivated personnel for full implementation of a comprehensive management plan.	3
9. Management action	a. Management actions required to fulfill the objectives of the protected area are not known.	0
	b. Management actions required to fulfill the objectives of the protected area are known, but there is little implementation; Or, there is significant lack of consensus on the management actions required.	1
	c. There is consensus on required management actions, and many but not all are being implemented.	2
	d. Required management actions are being fully implemented.	3
10. Information management and monitoring	a. There is no information management system (IMS) and no monitoring program to track the condition of the protected area or the effectiveness of management.	0
	b. There is a limited IMS and/or monitoring program in place to track the condition of protected area and management effectiveness, but major gaps remain.	1
	c. Both an IMS and monitoring program are in place for many key characteristics of the protected area and aspects of its management, but some gaps remain.	2
	d. There is a comprehensive monitoring program backed by an effective IMS, and both are used to make management decisions.	3
STAKEHOLDER INVOLVEMENT		
11. Communication with local stakeholders (villagers, local govt. agencies, etc.); includes conservation awareness programs	a. There is little constructive communication between management and major local stakeholders.	0
	b. There is *ad hoc*, opportunistic communication between management and local stakeholders.	1
	c. There is a program of regular communication between management and major local stakeholders, but it is not completely implemented.	2
	d. A planned program is working well to maintain constructive communication between management and major local stakeholders.	3
12. Local support	a. Most local residents are hostile to the protected area.	0
	b. Most local residents do not know the area is protected, are indifferent to it, or support it with significant doubts.	1
	c. Most resident communities see some benefits of the protected area and its management, and support it.	2
	d. Most resident communities see major benefits of the protected area and its management, and voluntarily contribute to its protection.	3

Table 11: NBCA management progress.

Topics were scored 0,1,2 or 3 points, corresponding to a range of 'absent' to 'excellent'. See Table 10 for scoring criteria.

TOPIC	DAP	DHS	DPV	HNN	NNT	NET	NHA	NKD	NPY	NXM	PDD	PHP	PKK	PLY	PPN	PXH	PXT	XBN	XPN	XXP
1. Legislation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
2. Boundary demarcation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	2	1?
3. Enforcement	1	1	1	1	1	1	1	0	1	0	0	1	2	1	1	1	1	1	1	1
4. Objectives	1	1	2	2	1	1	1	1	2	1	1	1	1	1	0	2	1	1	2	1
5. Funding	0	1	0	1	1	1	1	0	1	0	0	1	1	1	0	1	1	1	1	0
6. Information gathering	2	3	2	2	3	2	2	1	2	1	1	2	3	2	1	3	2	2	2	2
7. Planning	0	2	0?	0	1	1	0	0	2	0	0	1	2	2	0	2	0	1	1	0?
8. Staffing	0	1	1	1	1	1	1	0	1	0	0	1	1?	1	0?	1	2	1	1	1
9. Management action	1	1	1	1	1	1	1	0	1	1	0	1	2	1	1	1	1	1	1	1
10. Info mgt. & monitoring	0	1	0	1	0	1	1	0	1	0	0	1	1	1	0	1	2	1	1	0
11. Communication	0	2	0?	1	1	2	1	0	1	0	0	1	2	1	0	1	2	1	2	1
12. Local support	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
TOTAL POINTS	8	16	11	13	13	14	12	5	15	6	5	13	18	14	6	16	17	11	18	10
MGT. PROGRESS INDEX (total points 36)	**.22**	**.44**	**.28**	**.36**	**.36**	**.39**	**.33**	**.14**	**.42**	**.17**	**.14**	**.36**	**.50**	**.39**	**.17**	**.44**	**.47**	**.31**	**.50**	**.28**

It is useful to know if donor and management resources are focused in the right place. Consequently, Table 12 compares each NBCA's Management Priority Score (from Table 9) to its Management Progress Index (from Table 11).

Table 12: NBCA management priority vs. management progress.

NBCA	Management Priority Score (from Table 9)	Management Progress Index (from Table 11)
NNT	13	.36
XPN	12	.50
NET/PLY	11	.39
NHA	11	.33
PHP	11	.36
DHS	10	.44
PDD	10	.14
DAP	9	.22
HNN	9	.36
PXH	9	.44
XXP	9	.28
PKK	8	.50
DPV	7	.28
NPY	7	.42
NXM	7	.17
XBN	7	.31
PPN	6	.17
NKD	6	.14
PXT	5	.47

Table 12 shows that management attention has not always been targeted where needed most. This is partly because many NBCA management projects started before much was known about the individual significance of the NBCAs. Among the highest priority sites for immediate, increased management attention are **NNT**, **PDD**, **DAP** and **XXP.**

3.6.2 Conservation progress

The previous section assessed the progress of management in NBCAs. It is more difficult to assess the progress of biodiversity conservation in NBCAs, i.e., the *effectiveness* of management. An NBCA with a relatively high management progress index could still be losing its biodiversity. For example, DHS and PXT have among of the highest Management Progress Indices (Table 12), but recent IUCN reviews of its own five-year management assistance to the areas found no evidence of wildlife and habitat conservation (Berkmüller 2000, IUCN 2001).

Unfortunately, we are not yet at a stage where a comprehensive evaluation of most management projects' effectiveness at conserving NBCA biodiversity can be made. The projects are too recent and, related to this, none have scientific conservation monitoring programs in place. However, one aspect of biodiversity, habitat extent, can be measured remotely. Using Landsat images, LSFP compared habitat coverage for the years 1990 and 2000 for five NBCAs in central and southern Laos. This can give an indication of the stability of the areas.

The results for the five NBCAs are shown in Table 13. However, the data must be used with caution, and only as a general indicator, for these reasons:

- the habitat definitions used in 1990 do not precisely match those used in 2000, and some educated guesses of correspondence were required;

- the first year of coverage predates the establishment of the NBCAs by three years; therefore, it cannot be known how much of any change occurred *after* the area was legally protected;
- the images may have been taken at different seasons (dry vs. rainy), complicating habitat comparisons. This is indicated by the NNT data: The 1990 figures show 1 sq. km of "water", and in 2000 this has increased to 4 sq. km.. Since no dams or weirs were constructed in the NBCA in this period, it is probably due to dry season/wet season variations in the surface area of the Nam Theun River.
- any changes (or lack of) in forest cover for the NBCAs has little meaning without context. That is, if forest was lost in the NBCA, was the loss slower, faster or at the same rate as loss in the province generally?

Nonetheless, for some of the areas the indications are alarming. Dong Phou Vieng has apparently lost almost a third of its forest in the past decade. This may be in part because it was one of the two NBCAs added late to the system, in 1996. For the others changes range from a loss of 12% (PXH and NKD) to an apparent increase of 50% in HNN. The latter could be due to regeneration, but perhaps more likely to the difficulty of classifying the naturally sparse forest of limestone karst. Laos's most important NBCA, NNT, lost about 1.75% (about 50 sq. km) of its broadleaf forest in the 1990s (the loss of three-fourths of its conifer stands is a consequence of clearing the inundation area of the proposed NT2 dam).

The results also reinforce the importance of carefully identifying the particular pressures on each NBCA, and responding appropriately. Habitat degradation is clearly more important in PXH and DPV than in NNT, where other pressures, such as poaching, are known to be severe.

The value of expanding and standardizing such habitat analysis as an NBCA monitoring tool is discussed in Section 3.6.3.

Table 13: Habitat types and extent in selected NBCAs, 1990 and 2000.
Based on Landsat images (source: NOFIP and LSFP)

HABITAT CLASSIFICATION	AREA 1990/2000 (km^2)				
	Hin Nam No	**Dong Phou Vieng**	**Nakai-Nam Theun**	**Nam Kading**	**Phou Xang He**
Evergreen/Mixed Deciduous	237/352	1081/671	2857/2224	638/564	912/857
Dry Dipterocarp		266/254		19/14	102/37
Mixed Coniferous			/583		
Coniferous			38/10		
Bamboo	/5	/11	6/0.5		9/5
Unstocked	23/58	646/881	254/363	378/407	93/130
Swidden	/1	2/76	68/20	22/29	2/8
Savannah		9/52	2/20	/6	/32
Scrub	375/208	12/45	4/13	173/214	/45
Rice Paddy	0.5/1	26/44	4/13	111/113	13/14
Other Agriculture					/1
Grassland		15/20	3/5		1/2
Rocky Land	239/244			1036/1031	18/19
Water			1/4	3/1	
Urban Land		/1			

3.6.3 Options to improve management

3.6.3.1 Introduction

DoF has identified some key components of NBCA management in Laos, which have been widely discussed over the years and, in many cases, implemented. All have been addressed in this report. They include:

delegation to districts
land allocation & land-use planning
local participation in management
integration of conservation with rural development
public awareness/extension activities

In addition, there are less well-recognized aspects of management in the Lao context which merit attention. By drawing on the analyses in this report, interviews, written project evaluations and other documentation, and the authors' collective years of involvement in protected area management in Laos, we have identified several issues that influence a management project's likelihood of achieving NBCA conservation. They fall into three general topics, *Management Focus, Management Sustainability* and *Project Cooperation and Coordination*.

Some of the issues may seem trivial, but experience shows that each has significance for the success of PA projects in Laos. Nor is the list exhaustive. But by attending to these as a start (in addition to the better known aspects, listed above), protected area management in Laos will probably benefit.

3.6.3.2 Management focus

➢ **Accurate identification of pressures**

The pressures on NBCAs are high, biodiversity is being rapidly depleted from the system, and therefore time to act is limited. Consequently, it cannot be stressed enough that NBCA projects need to clearly identify and target the principal causes of biodiversity loss in the NBCA in which they work. In particular, because many significant pressures on NBCAs are external, it is important to recognize that a focus on village-based ICAD activities is important and necessary, but usually not sufficient, to conserve NBCA biodiversity.

Unfortunately, some projects have proceeded with only a vague, or preconceived, idea of the conservation challenges that need to be addressed. For example, at this writing the only project underway in the one of Laos's most important protected areas is primarily an agriculture improvement project. While this type of contribution is very important in Laos generally (and in many NBCAs), in this case it is being undertaken in one of the least populated NBCAs (consequently, few people will benefit), in villages that are comparatively prosperous, and in an NBCA where previous surveys have repeatedly identified wildlife and NTFP poaching by outsiders as the most pressing, overwhelming threat to the protected area's biodiversity.

Nooren and Claridge (2001) document the persistent failure of donor-assisted management projects to recognize and address the widespread problem of wildlife trade in NBCAs.

To correctly identify priorities for focus, we suggest that NBCA projects incorporate a longer-than-normal field assessment and planning phase. This is currently being tested, with full GoL support, by an IUCN-assisted project in NET/PLY NBCAs. The project has a two-year (minimum) planning phase *before* formal conservation interventions will be attempted. This allows time for careful identification and understanding of:

- sources of the most significant pressures on biodiversity;
- the socio-economic context in which these pressures act;

- the most important geographic areas of the NBCA to focus on, based on their biodiversity importance and severity of pressure;
- the capacity and needs of local staff.

Finally, an extended planning phase allows trust to be established between the advisory team and local staff before the real conservation work begins.

➢ **Improving food security of NBCA residents**

One of the principal problems facing residents of NBCAs is food security. One of the common responses of donor projects is to introduce or improve the management of livestock (pigs, poultry, cattle, water buffaloes). Yet, a recent GoL study found that livestock is more important for village *wealth* than food security (State Planning Committee 2000a).

Baird (2000a) makes a strong case for co-management projects to focus on improving productivity of traditional wild foods. In Laos, these are mainly fish and aquatic invertebrates. He argues that this can be better for an NBCA and the food security of its residents than attempting to increase village livestock. Some of his reasons, and others based on our observations are:

- Unlike livestock, wild fisheries are a direct contribution to biodiversity, and benefit other species, as well (e.g., otters, kingfishers).
- Livestock are a less secure food source, subject to catastrophic loss through disease, predation and theft.
- Livestock require the expense of vaccines, feed and pens.
- Large livestock are more important to villagers' *wealth* than their food security.
- Villagers may be stimulated to kill wildlife predators to protect livestock.
- Reliance on aquatic resources should stimulate villagers to protect streams from poaching and depletion by outsiders.
- Small livestock generate little trade income for remote villages, because eggs and the meat of pigs and poultry cannot be preserved for later transportation to market. Fish, however, can be preserved for later sale.

Advantages of this approach have been demonstrated by the IUCN/NAFRI NTFP project Box 6 describes one example from the project. Future NBCA projects could benefit from incorporating these lessons learned.

➢ **Forest rehabilitation**

More attention should be paid in NBCAs to promoting rehabilitation of damaged habitat. In Controlled Use Zones, this can be done with replantings of trees beneficial to villagers, such as fast-growing species for fuelwood.

In the remainder of the NBCA, rehabilitation should focus on identification and protection of suitable areas for natural regeneration. Given a chance, forests can often heal. Natural regeneration has numerous advantages over replanting in the context of NBCAs:

- it is cheaper, requires less labor, and is often more successful
- it allows growth of NTFPs used by villagers
- intermediate stages of young growth are good habitat for many wildlife species
- it results in a richer, more natural and diverse forest.

BOX 6: SUSTAINABLE MANAGEMENT OF WILD FROGS IN LAO PDR

Rachel Dechaineux & Veomani Chantanivong
IUCN NTFP Project

Forest foods are essential components in the diet and household subsistence of rural Lao communities. Consequently, assistance to improve rural livelihoods can focus on enhancing these existing natural resources, rather than, for example, the expensive introduction of non-traditional livestock.

Konglunoi village on the southern boundary of Xe Bang Nouan National Biodiversity Conservation Area (Wapi District, Salavan Province) has provided an excellent example in the case of frog management. In Konglunoi forest foods average 70-80% by weight of all foods consumed excluding rice, and they are used to purchase rice in times of shortage. Food sufficiency is the villager's overwhelming concern. Villagers recognise a trend of depleting food supplies, both wild and cultivated, due to changing ecological conditions and a breakdown of traditional patterns of resource use accelerated by increasing populations.

Frogs are the most frequently and abundantly consumed of all wildlife in Konglunoi. Likewise, they are the most valuable forest food harvested in both dry and rainy seasons, totaling 30-40% of economic value. Unfortunately, they are also the most rapidly declining of forest food resources. Hunted daily by all household members, frogs are sought throughout the year with free access to common property and private lands. Over the last 5-10 years changes in harvesting practices have evolved with technology and changing subsistence needs. Battery-powered lights have increased the frog catch at night, for example. Villagers report that the practice of scooping tadpoles is relatively new, a consequence of increased subsistence needs due to increased population.

With assistance of the IUCN/NTFP Project team, the community developed a strategy to reverse the decline in frog populations through seasonal harvest controls in a 45 ha block of good frog habitat. Village rules and regulations were developed to control harvesting in the rainy season/early dry season, which covers the frog mating season, early stages of tadpole development and adolescent frog migrations to drier areas. Konglunoi residents also felt confident to restrict the access of outsiders, in large part because the land allocation process had settled issues of open access, defined boundaries between villages, and secured village rights to the benefits of sustainable land management .

The community tested methods of monitoring the results. Data over two years revealed striking increases in frog populations. For example, catch-per-unit-effort analysis revealed 8-fold increases in harvests of frogs by dry season digging. During the wet season frog migration increased harvest off takes outside of the restricted areas. The increased harvests increased local interest and commitment to the resource management system. More families voluntarily included their land inside the conservation area, and adjacent villages began to copy the frog management scheme.

The positive experience in Konglunoi could serve as a lesson for rural development specialists or local people interested in improving their food security. The focus on using indigenous knowledge to expand existing resources shows that management solutions need not always be provided from the outside. Sometimes they are already present--one just has to look.

➢ Family planning

"In the long run, [unchecked] population growth will overwhelm any park that contains human populations within its borders." (van Schaik *et al*. 1997).

NBCA conservation projects to date have paid little attention to assisting NBCA residents, where appropriate, with family planning. This is despite the fact that:

- large human populations in NBCAs are the ultimate cause of many pressures projects seek to alleviate;

- there are major implications for project sustainability: achievements in land-use planning, enhancement of food security, etc. can be wiped out by expanding populations.
- large families are cited by rural Lao themselves as one of their livelihood problems (State Planning Committee 2000a).

Consequently, future NBCA projects should examine the feasibility and appropriateness of incorporating family planning programs.

➢ **Curtailment of immigration**

Projects and local government need to cooperate to slow the rate of immigration to some NBCAs. This will benefit the livelihoods of the traditional residents, as well as biodiversity.

➢ **Enforcement**

Wildlife and other resources in many NBCAs are declining rapidly due to overexploitation (Duckworth *et al.* 1999, Robichaud and Stuart 1999, FOMACOP 2000c). While the ICAD approach is appropriate in the Lao context, the process takes many years to achieve conservation results (Brandon 1997). In the meantime, implementation of regulations should focus on public awareness-raising rather than penalties, as much as possible (LSFP and DoF 2000).

However, there will always a few individuals (often outsiders who do not benefit from the ICAD projects) who will violate laws and regulations. Therefore, some emphasis on enforcement is necessary (Flint and Chantavong 1998). Successful NBCA management must include a balance of necessary components: village development, public education, staff training, and enforcement. Given the high and rising value of some wildlife and NTFPs, conservation of the biodiversity in NBCAs will probably not succeed without an strong enforcement component.

Unfortunately, the concept of 'enforcement' is sometimes viewed as a threat to, or an imposition on villagers. But in the Lao context it can be a benefit. The illegal extraction of forest resources by aggressive outsiders is a threat to the livelihoods of local residents of some NBCAs, yet the residents often lack either the power or the confidence to stop it (Steinmetz *et al.* 1999). Consequently, some enforcement is critical to the success of participatory ICAD management--it will be impossible to help villagers use forest resources sustainably if the resources are not protected from outside exploitation. On the contrary, residents will be motivated to use up the resources as fast as possible, before outsiders do.

A recent study of the effectiveness of 93 protected areas in 22 tropical countries found that the most important determinant of protected area effectiveness was the density of guards (Bruner *et al.* 2001).

Enforcement is a challenge in the NBCAs for at least three reasons:

1. Staff numbers are small.
2. Staff are trained in forestry, not law enforcement.
3. Staff often have limited or unclear enforcement authority.
4. Staff cannot simultaneously foster participatory management with villagers *and* fill the role of 'policeman' to punish members of the community who violate agreed rules (FOMACOP 2000c).

Village militia can fill some patrolling and enforcement roles, but they should not be expected to carry the burden alone. It can be a dangerous activity, and they have many other demands on their time--growing food, caring for their families, etc.

One solution could be partnerships between NBCA management and the military. Each district and province has its own contingent of army. The feasibility of assigning some units to NBCAs as park guards should be investigated.

➢ **Project geographic focus**

To date, donor projects have not always focused on the most important NBCAs (see Table 12), partly because information on the areas was limited when the projects were conceived. Better information is now available, and in the future GoL and donors should cooperate to focus management where it is most needed.

Similarly, there has been a tendency for donors to 'accumulate' NBCAs in an *ad hoc*, dispersed fashion. FOMACOP worked in four NBCAs in four provinces, as did LSFP. Khammouane Province currently has three different donors assisting its three NBCAs.

This geographic dispersion has some disadvantages:

- It is inefficient. Projects must help train and assist multiple sets of provincial staff, and pressed provincial governments must multiply the work of donor negotiation and administration by the number of donors in the province.
- It inhibits a landscape approach to conservation. A donor project focused on just one NBCA in a province is unlikely to see and foster the conservation benefits of linkages with provincial and district protected areas across the province. This is easier for a donor assisting multiple NBCAs in one province.
- It retards donor/government relationships. The quality of a donor's relationships with provincial and district governments is one the most important determinants of its progress in assisting NBCA management. These relationships will be weaker if the donor must split and dilute attention among multiple provinces.

Mindful of the need to concentrate effort in the most important sites, donors interested in supporting conservation in multiple NBCAs should ask GoL's assistance to focus, whenever possible, on sets of NBCAs within one province.

➢ **Monitoring**

More resources need to be devoted to monitor the success of NBCA projects. As a start, DFRC and NOFIP could cooperate to develop a standard protocol for periodically assessing habitat changes to NBCAs from satellite imagery (similar to the comparisons in Table 13). This would allow early identification of conservation problems. The management team of DHS has set a good example by using IKONOS satellite imagery to monitor the expansion of coffee plots in the NBCA (IUCN Biodiversity Conservation Project, undated draft of the *Dong Hua Sao Illustrated Brief and Management Guide*). Similar methods need to be formalized and coordinated nationally for all NBCAs.

NBCA projects should also strive to develop on-the-ground programs to monitor biodiversity in their areas. There has been extensive design and attempted implementation of ICAD-type projects in Laos, but as yet little examination if they are succeeding to conserve biodiversity (or improving the quality of life of villagers) (LSFP and DoF 2000). Without such information, the evolution of successful management models is not possible. The most feasible on-the-ground method of NBCA biodiversity monitoring in is probably collaborative monitoring programs with villagers (Steinmetz *et al.* 1999). With training and supervision, villagers can keep logbooks of natural history observations, systematically run camera traps, and so forth. Talented and dedicated individuals can form the core of "Joint Monitoring Teams". Such methods are being tried in XPN, and an NBCA monitoring manual (Ling, undated) has been prepared based largely on the experiences there and in NHA NBCA.

Monitoring the progress of management can be done periodically (perhaps every 2-3 years) by repeating the "NBCA management progress" assessments used in Section 3.6.1.

➢ **Database management**

A standardized biodiversity database in DFRC to collect, store and use information generated by the NBCAs is still lacking. One was set up in the late 1990s with the assistance of WWF, but it has not been maintained. A replacement is needed to enhance DFRC's nationwide coordination role, but a prerequisite to another attempt should be an examination of why the first one failed.

➢ **Landscape approach**

NBCAs are just one facet of conservation within Lao PDR. Important populations of wildlife may move or live entirely between NBCAs. NBCAs may be just one waystation for ecological processes such as fish migrations, tree dispersal and nutrient flows. Finally, situated between NBCAs are provincial, district and village protected areas. Consequently, as conservation management in Laos progresses, NBCAs should not be viewed as conservation end-alls, but rather as the most important components of a broader conservation landscape.

Because many of the pressures on protected areas come from outside (Davey 1998), it is also important to think at a landscape level when developing strategies to relieve pressures on specific NBCAs. ICAD participation needs to be expanded beyond villages to *all* regional stakeholders--district and provincial planning committees, customs, army, etc. Many of the outside pressures that come from the landscape outside NBCAs can be relieved only with their involvement.

3.6.3.3 Management sustainability

➢ **Project duration**

If the biodiversity of protected areas is to be conserved, long and sustained support to management is necessary (Sinclair *et al*. 2000). Brandon (1997) found that ICAD projects rarely work unless they are funded for 15 or 20 years. Yet the duration of most donor-assisted NBCA projects has been only 3-5 years. This is particularly short in the Lao context. It can take one year just to proceed through the administrative and bureaucratic processing in Vientiane before the project can begin field activities. Subsequent activities generally proceed at a similar pace, and conservation problems in general usually turn out to be more complex, and slower to solve, than they appeared initially. A Lao perception of the FOMACOP NBCA project is that expectations were too high given the project's wide scope but short duration (five years).

In the future, donors and GoL need to cooperate for longer project commitment to NBCAs (Southammakhot 2000). This is particularly true since funds are limited. If, for example, a fixed $1 million is available, it may have a greater benefit for biodiversity if it is spent over twenty years in an NBCA than over five. We say this because a common management constraint cited by NBCA Heads is the funding gap between donor projects. Perhaps future projects should incorporate in their budgets modest 'severance' funds to maintain the project's activities and momentum for some period after the advisers leave. Efforts to this end have been made in, for example, DHS, NPY and XPN.

➢ **Project size**

To be effective, conservation projects need to be tailored to local capacity (Davey 1998). One weakness of the FOMACOP project was that it was too large (FOMACOP 2000a, Jefferies 2000). It overmatched the Lao administrative and technical capacity to absorb it.

This capacity cannot be expanded by a bigger project with bigger funding--that only chokes the government system and slows the project down.

Likewise, the Lao technical capacity to support donor field projects is limited. Yet large NBCA projects need large Lao counterpart staffs, both to assist with the many project activities, and to provide trainees to fulfill the projects' capacity-building goals. Capacity-building *is* a desirable and critical component of any Lao conservation project. But a donor project can only increase the *skills* of staff, it cannot increase their *numbers*. Only GoL can do that, and its human resources are limited. Consequently, it has been common for a PAFO to pull staff from units unrelated to conservation to fill staff needs of a new donor NBCA project. The project then trains these staff in the work of the NBCA, but once the project ends, the staff (and their training) are often reassigned to their old, unrelated units. A large project cannot know which of the counterparts it invests in will remain once the project--and its funding--ends. This has major implications for project sustainability and cost-effectiveness.

At this writing, for example, staff assigned and trained to help a modest NBCA project in one district of a province have been re-assigned to help a bigger, better-funded NBCA project in another district. This has severely disrupted the progress of the first project.

Consequently, in the future donors and GoL should carefully examine the size of the *existing* local staff assigned *permanently* to an NBCA, and design a project to fit. The more a donor project overmatches local capacity, the less sustainable it will be. This includes local technical and financial capacity to maintain large fleets of 4WD vehicles, computer data- bases, etc, once the project ends.

- **Training in participatory techniques**

Good villager participation is of highest importance to most key NBCA management activities--land allocation, land-use planning, boundary demarcation, joint monitoring, etc. Yet fostering local participation requires specialized skills and, as Berkmüller *et al.* (1995a) note: "Village visits are among the most sensitive of management activities and should initially be conducted with staff who are trained...to facilitate participatory planning exercises."

Consequently, to maintain the success and momentum of donor-assisted management projects once they end, a high priority topic for local staff training is techniques of communication and participatory planning. This should precede training in other skills such as biodiversity survey methods and monitoring.

3.6.3.4 Cooperation and coordination

- **GoL-donor-NGO partnerships**

DoF and DFRC recommend that partnerships between GoL, donors and conservation NGOs work best when the responsibilities of each partner are kept clearly defined:

Donor: funding *NGO: technical advice*

DFRC and NBCA: implementation

Due to low staff numbers at central and provincial levels, NGOs are sometimes tempted to take over much of the project implementation. This should be resisted, and NGOs should maintain their advisory role as much as possible. Importantly, this fosters sustainability of project achievements once the project ends.

➢ **NGO-NGO partnerships**

GoL has indicated that, as much as possible, management in NBCAs should take an ICAD approach. However, successful, sustainable rural development is a complex task requiring a diversity of skills and inputs: rural economics, sociology/anthropology, health, agronomy, agroforestry, etc. Likewise, biodiversity conservation is challenging. It is a complex science that also demands a diversity of skills.

It is not surprising then, that development-oriented NGOs are often not the best at biodiversity conservation, and conservation NGOs are not the best at rural development. Organizations that try to 'focus' on both often do neither well. The technical demands of each discipline make it hard to master one, nevermind both.

An improved approach might be paired partnerships of development and conservation NGOs to help GoL design and implement NBCA conservation projects. This is not to suggest separate projects implemented independently (albeit simultaneously), but one project implemented jointly. This would fulfill GoL's focus on a development approach to NBCA management, while insuring that it furthered the prime NBCA objective of biodiversity conservation.

Alternatively, conservation NGOs could make a more conscious effort to employ rural development experts, and development organizations conservation biologists.

➢ **Project technical advisers**

NBCA Heads and other GoL staff often cite the importance of "good" advisers for donor NBCA projects. Defining what makes a "good" adviser is difficult, but discussions and observations suggest that these factors play a role:

1. Understanding that the adviser's role is to assist a GoL-directed project. Advisers should work to maximize Lao ownership of the effort.
2. Commitment to one project site. Lao counterparts have expressed difficulty in establishing relationships with field advisers whose responsibilities spread across several NBCAs, especially if the NBCAs are in different provinces. They prefer regular contact with one adviser.
3. Commitment of sufficient time. Once approved by GoL, technical advisers should be prepared to make a long commitment to Laos and their project site. Bureaucratic and adminstrative burdens are great on projects in Laos, and a host of other cultural and institutional factors make progress gradual. What constitutes an appropriate duration needs to be decided in consultation with GoL, but five years as a minimum is probably not unreasonable.
4. Previous country experience. *In general*, advisers with previous experience in Laos (or culturally similar Thailand) have better success than those who have been assigned to Laos from elsewhere. The reason is probably simple: they understand the culture, know the limitations of working here, but obviously had sufficient positive experience (namely, previous success working in Laos) to want to continue. This may be the single most consistent determinant of the effectiveness of a foreign adviser--more important than depth of general biodiversity conservation experience or education level.

➢ **Transborder cooperation**

In the past decade there has been much promotion around the world of transborder conservation initiatives. This is in recognition that biodiversity 'carries no passport' and key ecosystems are often split by international borders. In the mid-late 1990s WWF made significant contributions to fostering transborder conservation cooperation between Laos and Vietnam.

The idea of transborder cooperation is commendable, but reality can prove more difficult. We caution that until Lao PDR can organize effective protected area management on its own side of the border, adding the complexity and burden of transborder cooperation may only slow conservation progress in its NBCAs. This is one of the lessons learned from WWF's transborder work (Box 7).

At present in Laos, it is *far* higher priority for NBCA managers to establish good, cooperative relationships with other agencies in their *own* country (e.g., provincial and district planning committees, parastatal development companies) than in other countries.

BOX 7: TRANSBOUNDARY CONSERVATION: DIFFICULT IN PRACTICE; LESSONS LEARNED FROM THE WWF "LINC" PROJECT

Sharon London
WWF- Lao Project Office

Transboundary conservation encourages land management at scales that follow ecological boundaries rather than political ones. "Linking Hin Namno National Biodiversity Conservation Area (NBCA), Lao PDR and Phong Nha Nature Reserve, Vietnam Through Parallel Conservation" (LINC), is a transboundary conservation project with the goals to conserve biodiversity and to improve the livelihood of forest dependent communities through sustainable use of natural resources.

WWF initiated the LINC project for four main reasons:

- The Central Indochina Limestone block is an area of high ecological value which lies across the political boundary of Vietnam and Lao PDR, mainly in Phong Nha (and the Ke Bang Extension) and Hin Namno protected areas.
- Communities on both sides rely heavily on forest resources and face similar development constraints, such as chronic food insecurity and inadequate health care.
- Staff capacity is limited on both sides of the border.
- Many threats to the protected areas, such as logging and poaching, cross international borders.

WWF Indochina officially began working with the Vietnamese government in Phong Nha Nature Reserve in January 1998, and the Lao government in Hin Namno NBCA in September 1999, with the support of WWF-United Kingdom and the Department for International Development, UK.

LINC staff have found that, in reality, working across international borders is not easy. Political, social and economic differences between Lao PDR and Vietnam require different activities and approaches. For example, Lao PDR has approximately 5 million people, compared to 75 million in Vietnam. As a result, land and forests are used much more intensively in Vietnam. Vietnam's larger population and better education opportunities also mean it has more expertise for the work of conservation.

Although Hin Namno and Phong Nha protected areas were both established in 1993, their management systems differ greatly. Hin Namno NBCA has just one office in the district town with five government staff assigned to it, whose responsibilities change according to government needs. In Phong Nha, there are two forest product check points, three frontier-border posts, several ranger stations, and a full-time office in Son Trach Commune, with 25 dedicated forest guards in charge of protecting the nature reserve. Capacity building is necessary on both sides, but clearly at different scales.

Government approval of LINC activities took only a few months in Vietnam, while in Lao PDR the process required more than a year and a half. As a result, coordinating activities was nearly impossible. The differences and delays in government timing also added to donor delays for funding approval. Implementing a field project in Lao PDR with the head office based in Hanoi made project communication and coordination difficult.

A WWF Transboundary Scoping Mission visited to both sides of the LINC project, and other transboundary sites along the Lao, Viet and Cambodian borders. It concluded the following:

- International meetings of senior government officials create good will, build political support, and lead to country-to-country agreements as a pre-condition to cooperation at lower levels, but they are difficult and expensive to arrange;
- Resources must be focussed on achieving specific outputs in a restricted number of locations to achieve significant, long-term impacts;
- Current conditions within and between the participating countries are not conducive to transboundary conservation in the sense of fully integrating land and protected area management across borders;
- Attempts to create mutually-accessible country biodiversity data bases face large technical and institutional obstacles and are costly in terms of both staff time and funds;
- Collaborative land use planning in border areas is expensive, time-consuming, and potentially sensitive;
- Crossborder conservation projects are more management intensive than single-country ones.

While the LINC project works on the same overarching goals on both sides of the border, intrinsic national differences make parallel conservation difficult. Activities need to be separately tailored to the needs and capacity of each country. Once the LINC project is more established, we hope the transboundary component of the project, mainly in the form of policy dialogue and information sharing, will receive more focus. But until the basic needs of each reserve are met in its own country, transboundary cooperation must be a lesser goal.

3.6.4 The search for a national management model

GoL recognizes that development of a discrete, ICAD-based, participatory 'NBCA management model' would be a significant help to its NBCA managers in the field, especially as none have prior experience in successful protected area management.

The *Manager's Guide to Protected Area Management in the Lao PDR* (DoF 2000) goes a long way to providing this model. It has step-by-step guidelines for establishing NBCA administration, planning, participatory management, monitoring and links between conservation and development.

Given the uniqueness of each NBCA--its ecosystems, human density, ethnic variety, pressures and opportunities--significant further progress towards a uniform national model may not be possible. While consistency in management objectives and approach across the NBCA system is necessary (Davey 1998), each NBCA will require a unique solution to its unique set of management issues. An effective general model has proved elusive around the globe (Fisher 2000).

Institutionalization of one, overly-prescriptive management model could discourage the creativity so vital for managers to find workable solutions to local problems. To achieve biodiversity conservation in the NBCAs, the following are perhaps as important as a perfect ICAD model (if such a thing were possible):

- Good people. This may be more important than a good model. To build a quality house, it is more important to find a good carpenter than a good hammer. If an NBCA manager is dedicated and creative, he will probably find the right model for his area himself. Commitment to finding, training and *supporting* good NBCA managers will probably yield more conservation progress than attempting to perfect a management model.

- Management flexibility. NBCAs have unique problems, and these change over time. It is critical to embrace concepts of "adaptive management" or "action research" , and monitor and adjust management activities to meet the needs of the NBCA (Fisher 2000).

3.7 POTENTIAL MECHANISMS TO FUND FUTURE NBCA MANAGEMENT

Contributed by Emily Hicks, IUCN-Lao PDR

3.7.1 Introduction

DoF is heavily dependent on donor support for its various programs, including NBCA management. For example, while the overall operating budget for DoF in 1996-97 was about $1.5 million, external donors contributed about $15 million. Consequently, a major challenge facing the NBCA system in Lao PDR is how to finance long term management and support. This is a region-wide problem, and one step toward a solution is to view funds committed not as money spent, but as money *invested* to help protected areas fulfil the potential of their economic contribution to the nation. (McNeely 2000).

Although obviously very important to DoF, this reliance on external funding has disadvantages. First, the allocation of resources may be strongly influenced by the priorities of donor organizations. Furthermore, the timeframe for most projects does not extend beyond five years, making long-term institutional planning difficult. As donor funding is typically project-oriented, it also creates a tendency for division into isolated project areas rather than a cohesive institutional approach.

These constraints suggest a need for longer-term, more broadly-based forms of funding for NBCA management. Some such sources are described below:

3.7.2 National Environmental Funds

A mechanism for supporting a wide range of environmental and sustainable development activities is a National Environmental Fund (NEF). NEFs can take many forms, such as endowments, foundations, or trust funds.

Financing for NEFs can come from a variety of sources, including debt-for-nature swaps (described in more detail below), bilateral debt reduction agreements, contributions from donor organizations, direct contributions from national treasuries, taxes, fees and levies. Often NEFs are created through grants from international donors, along with a contribution from the host country government.

Types of NEFs:

- *Endowment* – The income generated by the capital endowment is spent, but the capital remains fully invested.
- *Sinking fund* – The capital is gradually used up over time.
- *Revolving fund* – Revenues from sources such as fund raising, government appropriations, levies, tourist taxes, and user fees are continuously reinvested in the fund.

NEFs are governed by a board of directors, which includes representatives from concerned government agencies, international donors, local and international organizations, and often scientific experts.

An NEF's scope is specified by its legal charter. A single NEF can serve a particular protected area, a whole protected area system, or general nationwide conservation activities.

NEFs have a number of advantages over other funding sources. For example:

- NEFs are a long-term source of stable financing, especially for activities where many years of sustained funding are important, thus reducing the dependency on donor funding cycles and fluctuations in government budgets.
- They can be used to finance a wide variety of activities within the scope of the charter, including environmental education, ICAD projects, management and monitoring of PAs, public awareness, and training.
- NEFs can serve as a mechanism for coordinating many different programmes under an efficient national environmental strategy. They also allow countries to balance their national priorities with those of donors, within the scope of the charter.
- NEFs can be funded by a wide range of sources, both national and international.
- The board of directors and committee system of governance encourages transparency and participation from a wide range of stakeholders.
- NEFs can disburse large amounts of money, or they can disburse relatively small sums of money to village-level activities that have no other obvious source of support.

Between 1990 and 2000, more than thirty countries set up National Environmental Funds, with a total value of over 500 million USD. During 1996-98, the potential for developing a conservation trust fund as an NEF for Lao PDR was considered by GoL, with technical input from FOMACOP. Article 47 of the Forestry Law permits the establishment of such funds. However, restrictions in national budgetary laws of Lao PDR impede implementation (staff of DoF, pers. comm.) If there is a legal remedy for this, conservation trust fund would be an option for the GoL to ensure sustained, stable levels of funding for long-term management initiatives.

3.7.3 Debt swaps

One means of generating revenue that can then be used to finance a National Environmental Fund is through debt swaps. Debt swaps provide an opportunity for developing nations to reduce their foreign debt, while investing in conservation activities.

Commercial banks often sell difficult-to-collect loans on secondary markets at less than their face value. In a debt swap, a nonprofit or NGO purchases in dollars a portion of the foreign debt of a country, then requests repayment of the debt from the country in local currency. Together, the NGO and local country earmark a specific purpose for this money, such as financing a conservation trust fund or supporting a conservation project.

Debt swaps offer countries like Lao PDR the opportunity to reduce their level of external debt, while generating national funds for activities such as NBCA management. Between 1987 and 2000, almost a billion dollars was leveraged though debt swaps around the world.

3.7.4 Carbon offset trading

Carbon offset arrangements are based on the Kyoto Protocol of the UN Framework Convention on Climate Change, to which Lao PDR is a signatory. Carbon trading involves a country that emits carbon dioxide paying another country as compensation for maintaining high levels of forest cover to absorb carbon dioxide.

3.7.5 Public/private partnerships

Although management of protected areas is typically viewed as the responsibility of government, public-private partnerships also offer important opportunities for supporting protected area systems. For example, private tourism businesses can work jointly with government agencies to generate revenue that is reinvested in protected areas.

Fees and taxes represent another potential funding source for protected areas. Many countries charge water use fees for projects such as large-scale irrigation or hydroelectric enterprises that rely on protected area watersheds. Because they are in effect also users of the protected area resource, tourist visitors to protected areas in many countries are charged

entry fees; where this is not feasible, countries sometimes have a specific tax (e.g. airport or hotel tax) that is earmarked for nature conservation.

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ANNEXES

Annex 1: ETHNIC LANDSCAPE OF LAO PDR AND THE NBCAS

Laos is ethnically highly diverse, not only in terms of the total number of ethno-linguistic groups, but also in their higher order classification within language families. Forty-seven groups are officially recognized (and over 230 by some counts), divisible into four language superstocks: Tai-Kadai, Austroasiatic, Hmong-Mien, and Tibeto-Burman (CARE 1995).

By convention since 1975, the population is divided into just three altitudinal groups: *Lao Loum, Lao Theung* and *Lao Soung.* The dominant Lao Loum comprise about half of the population. Ethnic Lao make up 30-35% of this total and are largely concentrated in the lowlands along the Mekong and Nam Ou rivers. Other groups of Lao Loum are more widely scattered, but all speak related languages in the Tai-Kadai family. Nearly all follow at least nominally the Buddhist religion. Taken together, the economic and educational levels of Lao Loum are generally the highest and, as wet-rice cultivators, they have the least direct dependence on forests, but they are heavily reliant on fish (wild and cultivated) for protein.

The *Lao Theung*, Austoasiatic-speaking groups are the oldest inhabitants of Laos, having been resident for at least 5,000 years. All the Austroasiatic speakers in Laos belong to the Mon-Khmer subdivision, mostly in the Vietic, Katuic and Khmuic sections. While some groups, such as the Khmu, have a wide distribution and are quite numerous in the north, many others are very small in number, and vulnerable to both cultural and physical extinction.

While a few *Lao Theung* groups still follow a foraging way of life, most are primarily dependent on shifting cultivation. An illustrative case for Nakai-Nam Theun is given in Box A1. In most cases cultivation systems are “rotational” (as opposed to “pioneering”) and linked to communal tenure over a large area of fallow land. Rotation periods generally range from 7-15 years and appear to be relatively sustainable, at least in conditions of low population density. Under such a regime, very little primary forest is cut (CARE 1995; Steinmetz *et al.* 1999).

Austroasiatic groups typically have very detailed knowledge of their forest environment and the species that live there. They thus represent a large repository of indigenous forest knowledge. This has obvious implications for “discovery” of potential new medicines, crop varieties and other forms of “bioprospecting”. Many groups also maintain taboos against hunting certain species (e.g. Gaur in Xe Xap, Steinmetz *et al.*, 1999) and protect spirit forest groves.

In contrast, the upland cultivation practiced by one Lao Soung group, the Hmong, is “pioneering”, and involves repeated cultivation of land until its fertility is completely exhausted. Surrounding forest resources are exploited with similar intensity, until the entire community relocates to a fresh location, usually in primary forest. This can be characterized as strategy of resource “maximization”, rather than “optimization”, as practiced by Lao Theung groups (CARE, 1995). The Hmong immigrated to Laos from China primarily in three waves in the nineteenth century (Chamberlain, 1997), and have today spread south as far as the border of Bolikhamxay and Khammouane provinces. Their agricultural and hunting practices are a significant management concern in several NBCAs, including NET/PLY, PKK and NNT. Some Tibeto-Burman-speaking groups in the north, such as the Akha, are also grouped as Lao Sung and share similar agricultural practices, including a tradition of opium planting in the highlands in winter.

BOX A-1: ETHNIC DIVERSITY AND ITS IMPLICATIONS IN NAKAI-NAM THEUN NBCA.

Nakai-Nam Theun is probably the most ethnically diverse NBCA. Almost 30 languages have been identified among its 5,000 inhabitants: 17 in the Vietic branch of Mon-Khmer, 1 in the Western Katuic branch of Mon-Khmer, 10 in the Tai-Kadai family (including the Sek) and a single language, Hmong, in the Hmong-Mien family (IUCN, 1997).

The Vietic peoples are the oldest, and among them several distinct lifestyle and linguistic groupings can be distinguished:

- Small groups of foraging nomads: Atel, Themarou, Miengbrou, Cheut (?)
- Traditional collectors and traders who have become emergent swidden farmers: Arao, Maleng, Malang, Makang, To'e, Ahoe, Phong
- Swidden farmers who move every 2-3 years between pre-existing village sites: Kri
- Combined swidden and paddy farmers: Ahao, Ahlao, Liha, Phong (Cham), Toum

Correlation between lifestyle and ethnicity among Vietic–speaking peoples:
These groupings should not be construed as evolutionary in nature. They apparently represent a conscious preference by the peoples concerned. Chamberlain (1997) sees them as representing a range of ancestral lifestyles in Khamkeut and Nakai Districts. Vietic speakers retain myths relating to the dhole (Asiatic wild dog) and the crow, which are symbols for hunting and foraging lifestyles. Several groups maintain spiritual territories covering large parts of the NBCA and manifest a deep reverence for nature. In total, Vietic-speakers comprise 29% of the NBCA population.

The first non-Vietic group to arrive in the area may have been the Sek in 1711. During the period of Siamese raiding between 1828 and 1860, the Brou arrived probably from the Gnomalath lowlands and introduced intensive swiddening. Northern Tai-speaking paddy farmers apparently began migrating in about 1880 to escape war in Houaphanh. Finally, the Hmong only reached the northern part of NNT within the past generation. Thus, the NNT area has absorbed successive waves of immigrants, but remains a refuge for some of the oldest and most forest-dependent groups.

After 1976, Vietic nomads, such as the Atel, Arao, Malang, Themarou, Mleng Brou, Ahoe, etc were relocated into villages, but have still not adapted to a sedentary way of life, and have declined to only a few tens of individuals. More enlightened management of NNT must therefore recognise and accommodate a diversity of lifestyles and needs. The Vietic groups, in particular, follow rather low impact and sustainable lifestyles and may not wish to adopt more intensive forms of agriculture and development. Other groups, such as the numerically dominant Brou, with a rapidly increasing population (now 55% of the NBCA population), have expressed a desire to relocate closer to roads and government services – providing suitable land can be found.

Finally, in recent years, all the inhabitants of NNT have come to feel threatened by large-scale incursions for hunting, NTFPs and wildlife trade from across the border. Control of this threat is currently the greatest challenge in the area (IUCN 1999).

Annex 2: LEGAL FRAMEWORK FOR NBCAs

Policy History

A conventional legal system for Lao PDR is still at an early stage of development, having begun only in the late 1980s. The National Assembly passed a Penal Code in 1989, a Property Law in 1990, and adopted a formal Constitution in 1991. Otherwise, government policies have been promulgated mostly through a series of Decrees, Regulations and Instructions issued at Presidential, Prime Ministerial and Ministerial levels. Madar and Salter (1990) reviewed eight such instruments relating to conservation that were in force in 1990 and proposed a comprehensive "Nature Conservation Act".

An important statement of policy at that time is contained in Lao PDR's Tropical Forestry Action Plan (Ministry of Agriculture and Forestry 1990), which followed a first National Forestry Conference, in May 1989, chaired by the Prime Minister. The Plan recommended much stronger emphasis on conservation, recommending that 70% of the country should be committed to forest of which 12 million ha (about 60%) would be for protection and conservation purposes. The control of shifting cultivation was clearly stated policy together with a de-emphasized role for industrial logging. In an issues paper attached to the main Plan, Xaisida and Sayer (1989) outlined a strategy and project recommendations on related topics, including Forestry Law, Protected Areas, National Conservation Strategy, multiple-use forest management, forest land use planning, improved management of timber harvesting, and conservation education. The fruit of many of these recommendations can be seen in the current portfolio of donor-funded projects.

At a general level, the National Forestry Conference and the TFAP probably represented the high-water mark of sectoral concern for "forests". Persson (1998), in a stimulating review, assigns the history of forestry aid into four decades, representing successive paradigms:

- Industrial forestry – 1960's
- Social forestry – 1970's
- Environmental forestry – 1980's
- Integrated resource management – 1990s

Although a crude classification, donor fashions do change and the above sequence has some application to Laos. Thus, the proliferation of protected area and other conservation projects over the past decade within the Department of Forestry probably owes much of its impetus to the Rio Earth Summit Conference, in 1992, and the big expansion of donor support for biodiversity conservation that followed. Already, however, concern for "biodiversity" has evolved into a paradigm that places greater emphasis on community-based management of resources. This favors an integrated focal site-based approach to rural livelihood development: in short, a "people-based" approach, which has been embraced by GoL.

Prime Minister's Decree 164

With evaluation of potential protected area sites proceeding rapidly from 1988 to the early 1990s (under LSFP Phases II and III), there was an urgent need to establish some legal basis for protected areas. This could not await the passage of more formal and comprehensive forestry legislation. Thus, on October 29, 1993, Prime Minister's Decree No. 164 was issued, creating a system of 18 "National Conservation Forests" ("Pa Sa-ngnuan Heng Sat"). Two more areas were added by Prime Ministerial Decrees in the mid-1990s.

The key provisions of PM 164 are summarized in Box A2. Although simple, they establish beyond doubt the government's intent to give protection at the highest possible level. PM Decree 169 *On the Management and Use of Forests and Forest Land,* issued a few days later, in November, 1993, provided a similar basic framework for forest management. This

decree included an important (and controversial) statement that all land not under permanent cultivation was to be considered forest land and that shifting cultivation was not to be considered permanent agriculture. Shifting cultivation is only permitted on degraded forest land and does not carry tenure rights unless it is on land that has been legally allocated. Objectives and conditions of allocating forest land to villages are further elaborated in PM Decree 186 (1994).

BOX A-2. SUMMARY OF KEY PROVISIONS OF PM DECREE 164 (1993)

Article 1 names and defines the 18 areas, and refers boundary details to a map (at scale 1: 500 000).

Article 2 states that various other forest reservations remain in force.

Article 3 specifies three main objectives: (I) protect natural resources, including forest, wild animals and water, (iii) maintain the abundance of nature and environmental stability (iii) protect natural beauty for purposes of leisure and research

Article 4 prohibits within reserved forests the cutting of timber, collection of non-timber forest produce, including all wildlife hunting, mining or reservoirs, ownership of land, destruction of cultural or historical sites, use of explosives, burning.

Article 5 states that anyone failing to observe these injunctions commits an offense and may be tried and punished.

Article 6 states that MAF and the provincial authorities are responsible for providing further regulations, planning, budget provision and field implementation.

Article 7 requires all other ministries to cooperate with MAF and publicize the provisions of the act

Article 8 nullifies any orders, rules and regulations contrary to this Decree.

The Forestry Law (1996)

In November, 1996, after several years of preparation, a comprehensive Forestry Law was approved by the National Assembly. An acceptable English translation became available in March, 1997. The main clauses relating to management of protected areas are summarized in Box A3.

While the Forestry Law establishes an overall framework for forest management, its application to conservation leaves several basic issues unclear, including:

- The status of NBCAs in relation to the five defined classes of forest is not very explicit. Clarification by DoF staff identifies them as the national-level Conservation Forests.
- The “five class” classification system is supposed to allow designation at all levels of government authority i.e. national, provincial, district and village levels. If we accept the interpretation of NBCAs as National CF, can they contain village production or protection forest “nested” within a Controlled Use Zone? That is, is some form of double classification permissible?
- The distinction between Protection Forest (PF) and Conservation Forest (CF) depends mainly on whether biodiversity or watershed (soil and water yield) protection are the primary objectives. However, PF can serve an additional, unrelated function

of "safeguarding strategic areas for national defense". If an area merits either designation, which should take priority, or is a joint designation possible?

- In terms of level of protection given, the restrictions on activity in the "Total Protection Zone" of a CF are very similar to those in a PF, the main difference being that no exemptions to banned activities are permitted in a PF. CF, on the other hand, may be zoned into Totally Protected Zones (TPZ), Controlled Use Zones (CUZ) and Corridor Zones. This could be interpreted as assigning a higher conservation priority to PF than CF, although this seems contrary to the Law's intent.
- Although the intention of specifying a "Corridor Zone" in the Law is clearly to provide control over thin necks of habitat linking larger blocks, it is not clear that any additional purpose is served by distinguishing this from CUZ, which can apply to many different circumstances.

Details for implementing the Forestry Law and resolving ambiguities are intended to be developed through Regulations for different subsectors. DoF has therefore established six Forestry Law Working Groups, of which one has drafted regulations for protected areas and wildlife, and also perhaps wetlands.

BOX A-3. FORESTRY LAW ARTICLES CONCERNING NBCAS

Article 16 creates a primary division of all forest in Lao PDR into five administrative categories: "Protection", "Conservation", "Production", "Regeneration" and "Degraded". Our interest here is largely confined to the first two of these classes.

Articles 17 and 18 define the functions of **Protection (PF) and Conservation Forest (CF)**, respectively. While these overlap, the emphasis in Protection Forest is on watershed and soil protection, with supplementary objectives of assuring "national security" and protection against "natural disasters" (e.g. floods). Meanwhile, Conservation Forest has a primary purpose of protecting fauna and flora, while also providing for the protection of tourism, cultural heritage, educational and scientific values.

Articles 39 and 40 state that **wildlife** belongs to the state. Management rights to the resource may be delegated, but species fall into "prohibited" and "non-prohibited" classes and hunting methods and trade may be regulated. A definition of "wildlife" and appropriate lists will have to be added as Regulations.

Article 41 expands on Article 17 with instructions on permitted and prohibited activities in a **Protected Forest**. These areas are subject to a blanket ban on "cultivation, tree felling, hunting or gathering of prohibited forest produce". No provisions for exemptions are indicated.

Article 42 outlines a tripartite internal zonation system for **Conservation Forests**, which creates greater scope for discretion than in a Protection Forest. "**Total Protection Zones**" (TPZs) are designated areas in which plant and animals may not be disturbed in any way and entry is forbidden without permission of Government. "**Controlled Use Zones**", on the other hand, can be used for hunting or NTFP collection, subject to specific local regulations aimed at supporting the goal of protecting the TPZ's. "**Corridor Zones**" are intended to provide a (presumably) narrow link for migration, dispersal (and, ultimately, gene flow) between larger blocks of habitat. All hunting and cutting of trees is forbidden.

Article 43 empowers Government to issue similar regulations to protect rare or endangered species regardless of whether they occur in Conservation Forests.

Article 45 states a general responsibility for the prevention of **forest fires.**

Article 46 provides for an annual "Tree Planting Day", a "Fish Release Day" and a "**National Day for the Protection and Conservation of Wildlife**". The two latter days are coincident and fixed for July 13 each year.

Article 47 provides for the establishment of a **"Forestry and Forest Resource Development Fund**", for which specific Regulations are to be promulgated.

Articles 68-73 provide for **privileges and punishments** for violations of the Law, and also creates an obligation for education of rural people in relation to the Law.

Annex 3: OTHER GOL AGENCIES CONCERNED WITH NBCAS

While the Ministry of Agriculture and Forestry is the principal line agency responsible for the NBCAs, several other branches of Government have (or should have) indirect interests in NBCAs and could be become management partners. A brief listing includes the following:

- **Science, Technology and Environment Agency (STEA), in the Office of the Prime Minister.** This was established in 1993 (originally as STENO) with objectives outlined in the National Environmental Action Plan (STENO 1993). Its environmental mandate is to provide broad inter-sectoral co-ordination and regulation, for which the adoption of a draft Environmental Protection Law will give it wide statutory powers. STEA is responsible for environmental impact assessment processes (for which detailed guidelines are under development) and for the implementation of international conventions relating to the environment, including the Convention on Biodiversity. STEA has also drafted legislation for controlling access to biodiversity for purposes of commercial exploitation. In addition, it has made initiatives in environmental education, in conjunction with Mekong River Commission and ASEAN, and in the development of a national botanic garden. Its mandate to regulate research also requires a close relationship with the National Agriculture and Forestry Research Institute (NAFRI).

  Policy-level co-ordination with MAF and other Ministries is through an Inter-Ministerial Committee on the Environment. However, the boundary between the responsibilities of STEA and MAF retains some confusion, which will hopefully be clarified under the proposed National Biodiversity Strategy and Action Plan.

- **Ministry of Defense**. The Lao army in manages PKK NBCA. In some other NBCAs (e.g. NPY, PXT and DHS), the army also plays a significant role in controlling access. NPY NBCA, along the Thai border in Xaygnabouly Province, is an important. For security reasons, the military first settled three villages in the area in the 1980s, but now prevents further settlement in the reserve and also forbids overnight stays without permission. NBCA management has established collaboration for joint patrolling with the army's own Conservation Unit there.

  Besides the regular army, provincial, district and village militia are established throughout the country and in some case make patrols into forested areas. While this can have great benefits for NBCA management, a key need is to prevent hunting and trapping of wildlife by soldiers.

- **Lao Women's Union**
  This is one of the most active of the mass organizations. They have representatives in many villages, and are cooperating with some NBCA projects, such as at Hin Namno. There is great potential for LWU to assist NBCA management in working with women in villagers, who are the main harvesters of NTFPs.

- **National Agriculture and Forestry Research Institute**
  NAFRI is a recently formed research institute in the Ministry of Agriculture. It focuses on a wide variety of topics related to sustainable forest management, such as NTFP use. For the moment, its research scope is limited to plants, and it does conduct research on wildlife (no institution in Laos does). Of particular value to NBCA management is its GIS and remote sensing unit, the National Office of Forest Inventory and Planning (NOFIP).

- **National University of Laos, under the Ministry of Education.** NUOL was established in 1995, by merging nine existing higher education institutions and a Centre for Agriculture. The Faculty of Agriculture and Forestry, at Dong Dok, offers both degree and diploma courses in forestry, which includes some course content on conservation and

protected areas. These are supported by a Lao-German Forestry Education Project. The Department has been granted management authority for research and training purposes over an area of 30,000 ha, in Sangthong District, near Phou Phanang NBCA.

- **National Tourism Authority (Ministry of Commerce and Tourism).** With the rapid growth of tourism in Laos and in interest in ecotourism generally, NTA has a strong institutional interest in the management for tourism of the NBCAs. To date the only concrete manifestation of this is the Nam Ha Ecotourism Project, which was recently initiated with UNESCO support. The potential for partnership with MAF is great.

- **Hydropower Planning Office and Electricité du Laos (Ministry of Industry and Handicrafts).** Hydropower development is a major economic opportunity within several NBCAs. In the cases of NNT and PKK this has required cooperation on planning and the commitment of resources from hydro revenue to NBCA management. However, in PKK the actual transfer of funds to NBCA management to the degree envisioned has not yet been fulfilled. This is an important test case for future hydro/NBCA conservation partnerships.

- **Timber companies,** particularly the three large military-owned development corporations, DAFI, BPKP and ADC are potential competitors for access to NBCA lands. In some cases, they also present opportunities for partnerships, particularly as BPKP and DAFI also have substantial investments in tourism.

- **Customs Department (Ministry of Finance).** The Department is responsible for regulating trade across the 15 or so recognized international border crossing points. At present, responsibility for documentation and taxing of wildlife and forest products appears to lie mainly with PAFO Forest Resource Inspection Officers, and recently with the Ministry of Commerce and Tourism. However, if any serious attempt was to be made at regulating illegal wildlife trade closer co-operation with Customs Department would be a starting point.

- **Ministry of Education.** Conservation awareness education is critical for both short-term and, especially, long-term conservation of Laos's rich biodiversity. The Ministry of Education is an obvious partner to provide an avenue for delivery of education materials and curricula prepared in partnership with MAF and STEA.

Annex 4. ECOLOGICAL OVERVIEW OF LAOS

Geology and Landform

A review of the Lao system of protected areas requires some understanding of the country's geographical and landform features, climate, habitats, biogeographical zones and key wildlife species. These provide the raw materials of biological diversity that conservation efforts aim to protect. This brief overview can do no more than indicate the range of relevant information, referring wherever possible to specific examples within existing or proposed NBCAs.

The geological history of an area is a prime a determinant of its landscape and, consequently, species assemblages. Lao geology has been mapped at a scale of 1: 1,000,000 by the Lao Department of Geology and Mines. There is also a simple written account (ESCAP 1990). A simplified history begins with the **Basement Complex** of ancient, metamorphic rocks of marine origin, which are found mostly along the eastern margins of Houaphanh, Bolikhamxay, Khammouane, Salavanh and Attapeu Provinces. These were originally extruded or deposited in a trench that later become uplifted to form the Annamite Mountains. These rocks are found in NXM NBCA, upper parts of NNT, XSP and DAP NBCAs. Igneous intrusive rocks of Paleozoic age are confined to smaller areas, mostly along Laos's border with Burma and in the highlands of Xaysomboun Special Zone, in the center of the country.

The distinctive **karst limestone** outcrops and habitats of PHP and HNN NBCAs, and parts of the north, were deposited in marine troughs in Carboniferous and Permian times. Subsequent uplift and erosion produced their present bizarre topography, complete with caves and underground rivers. Major mountains trending north-south in northern Laos, as in PDD, NPY, PLY and NET NBCAs also date to subduction and vulcanism in the late Paleozoic, followed by uplift and folding in the Triassic.

Since the beginning of the **Mesozoic** most of Laos has been above sea level, and about half the country is comprised of continental sandstones and conglomerates formed on land during a long period of intense erosion. These rocks can be divided into an older, harder series and a younger, softer one. In some areas sandstones are interbedded with shale and coal that formed in swamps or shallow sea embayments. Differential erosion has created plateaux, escarpments, and intervening lowland plains, which are collectively known as **"Indosinias"**. Such landscape characterizes no less than 11 NBCAs throughout the country: PDD, NPY, PPN, PKK, NKD, the plateau in NNT, PXH, DPV, XBN, PXT and parts of XPN. Boundaries of many of these NBCAs follow the base of an escarpment.

Indosinias topography has created a large number of "perched" river catchments draining gentle slopes away from an escarpment. Engineers, however, can divert such rivers and pipe them back through the escarpment, creating greatly increased hydropower potential in the nearby lowlands. The Nam Leuk, Nam Theun-Hinboun, Houey Ho, and proposed NT2 and Xe Nam Noy schemes all employ this principle. By comparison, none of the 68 installed hydro-plants in Thailand is a diversionary scheme.

Another important feature of the Indosinias is that their soils are generally poorly developed and deficient in nutrients, with a pH tending to acidity. Their agricultural potential is therefore generally low, except along valley bottoms or gaps where alluvial sediment has accumulated, such as the "corridor" zone in Phou Xang He NBCA. Indeed, the predominance of Indosinias throughout the country, together with rugged terrain in much of the rest, explains the paucity of good arable land, which is estimated at only less than 10% of land area. Alluvial soils in Laos are largely confined to the Vientiane Plain and a few smaller patches elsewhere. This is the main reason for the much lower population density and higher forest cover of Laos compared with neighboring Vietnam and Thailand, both of which have large populations centred on river floodplains and deltas. Historical factors play a secondary role (see Annex 1).

The **Tertiary Era** in Laos was a period when relatively few rocks were created. However, Pliocene uplift and erosion associated with Himalayan orogeny created the Annamites and much of today's mountainous terrain in the north. Entrenchment of the Mekong in its present course also dates to this time.

The only other notable recent geological event was an eruption in late Pliocene and Pleistocene times of alkaline, **basaltic lava on the Bolavens Plateau**. These flows cover older Indosinias sandstones that remain exposed in central and eastern parts of the plateau producing strongly contrasting vegetation in places. Combined with high rainfall and cool temperatures, much of the Bolavens has high agricultural potential and is now being rapidly cleared for coffee plantations. Dong Houa Sao NBCA , which covers 910 sq km of this area, is probably the only NBCA which carries a high opportunity cost in terms of foregone agricultural potential.

A final consideration of Lao geology is that the country appears relatively poor in oil or mineral prospects, although the Department of Geology and Mines has identified potential commercial deposits of coal, cobalt, tin and gypsum (among others), and low-grade alluvial gold is widely distributed. Apart from some long-established alluvial tin-mining in enclave valleys within PHP, no NBCA faces presently faces a serious threat from proposed mining or drilling operations. Limestone quarrying, however, is an issue in PHP and the other karst limestone NBCA, HNN. Peat extraction poses a threat to parts of XPN NBCA.

Climate

While Laos has a predominantly tropical monsoonal climate, there are important gradients in temperature, rainfall and seasonality related primarily to altitude, latitude and variable exposure to two monsoons. Highest rainfall, with annual means in excess of 3,000 mm, occurs in the central provinces of Bolikhamxay and Khammouane, extending down the Annamite range, with an important outlier on the Bolavens Plateau. The north is generally cooler with a longer dry season, although winter morning mists play an important moderating role. Lowest rainfall occurs in Savannakhet and in a narrow rain shadow band up the Mekong and Nam Ou river valleys in the north.

Vidal (1960, adopted by Gressitt 1970) combines two rainfall classes, three winter temperature zones and three measures of seasonality to produce a map of six ecological zones. He uses this as a basis for a first order classification of vegetation to which soil type and human disturbance are added as additional factors.

Vegetation cover and classification

Vegetation cover is a fundamental dimension of biodiversity and a major influence on animal distribution and abundance. Systems for classifying vegetation depend on their purpose, the mapping scale and the methods used (e.g., air photos, satellite imagery, ground sampling) Satellite imagery is generally the cheapest method for repeated assessment of large areas, but rarely offers the resolution of large scale aerial photography. For reliable classification, all forms of remote sensing require ground-truthing. At the present time three studies of habitat classification and rates of change
are commonly cited for Laos (Box A4).

BOX A-4. THREE STUDIES OF LAO FOREST COVER

1. Forest Cover and Land Use in Lao PDR, National Office of Forest Inventory and Planning (NOFIP).

This important baseline study, carried out under LSFP III and completed in 1992, employed 1:30,000 scale aerial photos from 1981/82, updated with information from SPOT satellite images taken between 1989 and 1992 and limited field inventories to produce land use maps at a scale of 1:50,000 and 1:100,000. The main objective of the study was to provide information on the status and changes of forest cover and land use between 1982 and 1989. One of the results was a widely cited estimate of 47% national forest cover in 1989, declining by about 67,000 ha per year. Broken down by region, the study indicated 59% gross forest cover for the southern region, 54% for the central provinces (Khammouane to Xieng Khoang and Vientiane) and 38% for the northern region. Relative loss rates between 1982 and 1989 were highest in the central region and lowest in the south. The study distinguished eight forest types, together with "other wooded areas", "potential forest land", "permanent agriculture" and "non-forest land". All the data for forest type were disaggregated by crown density, stand structure, slope, elevation class, province and region. Subsets of these data formed the basis for a detailed analysis of NBCA habitat coverage by Berkmüller *et al.* (1995).

2. Mekong River Commission/GTZ Regional Forest Cover Project (1998). This very recent study has produced maps and area estimates, based on Landsat TM imagery digitized at a scale of 1: 250,000. The purpose of the study was to establish a base-line for long-term monitoring of forest cover and conversion rates for all territories of the lower Mekong basin. The mapping scale was smaller than the earlier NOFIP study, and fewer forest categories were distinguished. The study included no systematic ground-truthing. Total forest cover is estimated at 40% of land area, including 26% of continuous canopy "Evergreen" and "Mixed" forest types, 3% of "Deciduous" forest and 11% "Forest Mosaic", which includes fallow land. Gross cover figures for the provinces vary from 9% in Louang Prabang to 75% in Attapeu. From these figures there would appear *prima facie* to have been an on-going loss of forest cover at a rate of around 1% per year. However, only repeated studies using identical methods and definitions can confirm this.

3. Protected Area Systems Review of the Indo-Malayan Realm (MacKinnon 1997). This regional study is an update of an earlier analysis (MacKinnon and MacKinnon 1996). It includes estimates of both "original" vegetation areas and current remaining areas, including proportions within the protected area system. Sources of data for present coverage in Laos are cited as UNEP GRID Bangkok, with additional information from DoF. This regional amalgam of data is maintained by the World Conservation Monitoring Centre, Cambridge, U.K. MacKinnon estimates that only 17.4% of Laos is under "natural" vegetation with another 36.2% of secondary forest cover, or 53.6% total.

MacKinnon notes that the large apparent difference in estimates between studies is mainly due to different treatment of secondary and degraded forests.

A summary of the classification systems used in the studies described in Box A4 is given in Table A1. Equivalence between them is hard to establish. MacKinnon's system is the most ambitious, but gives no detailed classification criteria (e.g. between subtropical dry evergreen, broadleaf hill and montane evergreen types). NOFIP does not attempt to distinguish the various montane formations directly and sets its divide between lower and upper evergreen and mixed deciduous types at a mere 200m asl. (possibly a proxy for identifying commercially harvestable forests on reasonably flat land). The study disaggregated all forest types into four altitudinal bands (<200m, 200-500m, 500-1000m,<1000m).

Table A-1. Habitat classification systems adopted in three recent studies of forest cover in Laos.

MRC/GTZ (1996)	NOFIP (1992)	MacKinnon (1997)
Evergreen (full canopy and mosaic)	Dry evergreen (lower and upper types)	Tropical everwet
		Semi-evergreen
Rocks	Rocks	Forest on limestone
Mixed (full canopy and mosaic)	Mixed deciduous (lower and upper types)	Tropical moist deciduous
Deciduous (full canopy and mosaic)	Dry dipterocarp	Dry dipterocarp
		Tropical montane evergreen
	Coniferous/Mixed coniferous	Tropical pine
		Subtropical pine forest
		Subtropical broadleaf hill
		Subtropical dry evergreen
		Subtropical montane
Plantation	Agricultural plantation	Plantations
Regrowth	Unstocked	Degraded forest
Wood/scrubland and bamboo	Bamboo	Bamboo
	Savannah/open woodlands	
	Heath and scrub forest	Scrub
Grassland	Grassland	Grassland
	Ray	
	Other agriculture land	Cleared land
Agricultural land	Rice paddy	Cultivated land
Inundated areas/Wetland	Swamps	Freshwater swamp
Water	Water	Rivers/lakes
Urban land	Urban areas	
Other (forest and non-forest)		

Champion and Seth (1968), Whitmore (1984), and Ashton (1990, 1991) all provide useful insights into forest classification in general. For Laos, Vidal (1960) provides the only detailed information to date, and the only information based on field observation and collections. Although his classification system is probably too complex for general use, his monograph provides much information relevant to protected area planning. The following notes on forest types in Laos are taken largely from his work.

- **Tropical lowland evergreen rain forest** (*sensu* Whitmore,1984) is dominated by dipterocarps and is probably quite limited in extent, mainly confined to the far south (e.g. Xe Pian). *Dipterocarpus costatus, Hopea oderata and Pentace burmanica* are characteristic large trees.

- Most other forests in high rainfall areas are more properly termed **"semi-evergreen" (Whitmore, 1984) or "seasonal evergreen**" (Ashton, 1991), because they suffer a regular drought of at least 2-3 months each year, which influences their structure and composition, for example, reducing the incidence of large woody climbers. *Dipterocarpus alatus (Mai Nyang) and Anisoptera robusta* are ususally diagnostic upper canopy species. However, there are important edaphic variants. On red basaltic soils in Dong Houa Sao, for example, there occurs a forest with abundant *Lagerstroemia spp., Terminalia biolata, and Shorea vulgaris, but no Dipterocarpus alatus*. These forests also seem to be the main habitat of *Sterculia lynchnophorum (mak chong)*, which is a mast-fruiting species of great NTFP importance in southern Laos.

- **Forests on limestone** are highly distinctive, often dominated by cycads, pandans, *Dracaena* spp. and *Taxotrophis ilicifolia*. The herbaceous flora, including orchids, of areas like PHP and HNN has been little studied, but is likely to be rich in local endemics.

- **Northern Dry Evergreen Forests.** In the drier and mountainous conditions that predominate north of Vientiane, lowland evergreen and semi-evergreen forests are much less common, but reoccur in extreme northern Laos (e.g. Phou Dene Din), apparently because of the offsetting influence of lower temperatures and morning mists at the northern margins of the tropics (Ashton, 1991). Such forests are little known in Laos (Vidal apparently had little opportunity to work there) but have been well studied in neighboring Xishuanbanna, China (e.g. Yunnan Society of Ecological Economics 1992).

- **Dry Dipterocarp Forest**, with its open, deciduous canopy and characteristic dominance by *Dipterocarpus obtusifolius, D. tuberculatus*, *Shorea obtusa, S. siamensis* and *Terminalia tomentosa,* is the most identified type of forest. It covers much of Savannakhet and Salavanh (e.g. parts of Xe Bang Nouan) and most of neighboring northeast Thailand. Although this is a dry region with up to five dry months per year, Vidal concludes that predominance of Dry Dipterocarp Forest is primarily due to laterized soil conditions, which impede water infiltration and deep rooting systems.

- In northern Laos, despite similar rainfall conditions, Dry Dipterocarp Forest is almost unknown, being replaced on the better drained soils there by various forms of **Mixed Deciduous Forest***,* in which bamboo generally dominates the understorey. In Burma and northern Thailand, MDF is commonly dominated by teak (*Tectona grandis*), but in Laos this type is confined to certain parts of Xaygnabouly and Bokeo Provinces, where it is associated with soils of reasonable fertility. Other commercially important species include the rosewoods, *Dalbergia* spp. and *Pterocarpus macrocarpus* and *Afzelia xylocarpa.*

- **Pine forests**. On upland plateaux with poorly drained sandy soils, *Pinus merkusii* often forms dominant stands, most conspicuously on the Nakai plateau and in the western part of Phou Khao Khouay. Fire is an important factor maintaining these forests, which otherwise tend towards a mixture of pine and dipterocarps. In cooler conditions around the Plain of Jars, in Xieng Khoang, similar forests are dominated by *Pinus kesiya* and *Keteleeria roulletii.*

- **Lower montane forests**, dominated by Fagaceae and Lauraceae, (oaks and laurels) are less clearly differentiated from lowland formations than in regions closer to the equator. Ranges of "**dry hill**" and **"subtropical" evergreen types** occur along the Annamites, but have yet to be properly described.

- Around passes that are exposed to a wet winter monsoon from the South China Sea an **everwet lower montane** formation also occurs (e.g., areas along the Vietnam border in Bolikhamxay Province). At higher elevations, the regionally endemic conifers *Fokenia hodginsii* and *Cunninghamia lanceolata* are locally common. The very high commercial value of their timber has encouraged logging in otherwise remote and undisturbed areas, including parts of Nam Xam NBCA. Elsewhere in the north more clearly **deciduous montane** formations occur.

- At high elevations (>1,500 m) and lower sites exposed to wind, a gnarled **upper montane** forest formation occurs. Phou Bia is the highest mountain in Laos (2,817 m), and in its natural state would have offered a long altitudinal transect of vegetation types. However, much of its habitat has been degraded and it is included within an NBCA.

- The balance of evergreen and deciduous elements in all the above forest types has been strongly influenced by **human disturbance**, whether selective cutting, clearing for swidden, war-time bombing and chemical defoliation, or fire. By opening the canopy, these activities

expose plants to greater water stress in the dry season. This generally favors deciduous species, altered leafing patterns in otherwise evergreen species, or conifers at the expense of broadleaf species. *Lagoestroemia* species are commonly an indicator of late **secondary forest.** Although generally less species rich, secondary forests can include some important commercial species (e.g., *Styrax tonkinense*). Repeated clearing with inadequate dispersal of seed leads to an **arrested succession of scrubby vegetation or bamboo**. Regular burning leads to further degradation, ultimately to *Imperator cylindrica* **grassland**, which now covers large areas of northern Laos.

In considering the range of forest types to be accommodated within the protected area system, it is important to remember that this is only a crude level of assessing botanical richness. A finer level of resolution at habitat or species level is often necessary. For example, Vidal (1960) describes a distinctive subtype of northern evergreen forest in Xaygnabouly (in an area proposed for inclusion within Nam Pouy) that is rich in members of the families **Annonaceae, Meliaceae and Sapindaceae**, with a fern (*Selaginella*) dominated ground cover. Examples of this habitat can be seen beside the NPY NBCA field office and lie immediately adjacent to quite a quite different Mixed Deciduous Forest containing the easternmost stands of native teak (*Tectona grandis*) in the world. The two types are apparently separated by a soil difference, reinforced by differential susceptibility to fire. Both the teak and one of the Meliaceous species (*Chukrasia tabularis*) have high value as a source of selection stock for tree plantations.

Forest fire

Forest burning is annual event during the dry season over much of Laos, particularly in the north. It contributes to a heavy haze that can last from March until the onset of heavy rains in May or June. Almost all fires are set by people, usually as a deliberate tool for clearing land prior to swidden planting, but also to improve grazing and facilitate hunting. Once set, fires can burn over tens or hundreds of square kilometres of forest or scrubland. While villagers will occasionally act to protect threatened crop lands and village forests, fire is generally accepted as part of the traditional land-use cycle.

The cumulative effect of this practice is to convert evergreen and semi-evergreen forests, firstly to mixed deciduous or dry dipterocarp types, and then to bamboo-dominated scrub and finally to *Imperata* grassland. Most of northern Laos has been degraded in this way and fire is a major management threat to remaining forest areas in NPY, PLY, PKK and NHA. Although research data are lacking, the process has probably contributed strongly to the decline of wildlife in these reserves, both through direct losses of nests and young animals, habitat loss and increased susceptibility to hunting.

Wetlands

Wetlands are a distinct and very important additional class of habitat that is unrepresented in the present system of protected areas. The most important wetland is the Mekong River system, comprising the main course of the river, which flows for 1,700 km through Laos, together with its tributaries and associated seasonal swamps, riparian vegetation and grasslands. Claridge (1996) compiled an inventory of the most important wetland areas and their biodiversity values. Vidal (1960) describes the Mekong riparian vegetation. The Mekong contains probably the second largest fish fauna of any river in the world, with over 400 species identified to date and a total that may exceed 500 species, including such large and endangered species as the Mekong giant catfish (*Pangasisus gigas*). The fish fauna is not only of great intrinsic value, but also plays a vital role in the national economy as a source of protein and rural income (Roberts 1993; Roberts and Baird 1995).

Laos also contains the river's most impressive physical feature – the Khone Falls and the Siphandone ('four thousand islands') wetlands immediately upstream. Siphandone provides a vivid illustration of the diversity of riverine habitat, differentiated by depth, current speed, substrate, seasonal flow and so on. At 14 km in width, Khone Falls are the widest rapids in

the world. Khone Falls also form a significant biogeographic barrier to many fish and to a small population of Irrawady Dolphins. Dolphins also occur on the Xe Kong system, but both populations are highly endangered (Baird and Mounsouphom 1997).

Since many fish species are migratory, either longitudinally up and down rivers or laterally into tributary streams and seasonal swamps, there is a strong interdependence among wetland habitats. Over the whole country wetlands support a diverse assemblage of large animals, besides the aquatic microfauna. Duckworth *et al.*(1999) list 168 bird species that are specifically associated with wetlands, together with a dozen turtle species, Siamese Crocodile and a handful of mammals (e.g., three otters, Hog Deer, Fishing Cat).

Biogeography

The traditional mission of biogeography is to classify and explain the distribution of fauna and flora at species and higher taxonomic levels. While for some species this may depend strictly on local habitat factors, broader patterns are often discernible, although these tend to vary with the groups under study (e.g., plants, insects, birds etc.) A biogeographical perspective also draws attention to underlying regional patterns, which must be considered when drawing up national priorities. At a global level, regional biogeographic divisions and habitat groupings (biomes), combined with assessments of threat and opportunity have been used as a basis for determining conservation "hot spots" and priorities for investment (e.g. MacKinnon 1997; Olson and Dinerstein 1998).

Berkmüller *et al.* (1995a) follow the system of MacKinnon and MacKinnon (1996), which is based largely on Udvardy's global classification (1975), modified locally after Vidal (1960). The identified regions are strongly biased towards plants, mammals and birds. MacKinnon (1997), in updating the earlier review, has amended the boundaries slightly so that Laos now falls into three units and five subunits of the Indochinese Subregion, as follows (after MacKinnon 1997):

Unit 10 - Indochina

Subunit 10a - **Central Indochina** - tropical lowland plains (Mekong plains of southern and central Laos; elsewhere the Salween lowlands, most of northern and northeast Thailand, and most of Cambodia).

Subunit 10b - **Northern Indochina** - subtropical hilly sector (Most of northern Laos, upper Shan States, extreme northern Thailand and northwest Vietnam)

Subunit 10c - **Transitional Indochina -** montane, temperate sector (confined to northern Phongsaly, including Phou Dene Din, and occupying much of adjacent southern Yunnan)

Unit 5 - Coastal Indochina

Subunit 5c – **North coast** (from Hue to the Red River delta, but including the Annamite mountains). Note that the northernmost end of the Annamites are transferred to Subunit 10b. This SubUnit includes most of the Trung Son Endemic Bird Area.

Unit - M: Annamese Mountains

Subunit Ma – Central Annamite mountain block (a limited area in southern Laos, including Xe Xap and Dong Ampham, continuing south along the Vietnam-Cambodia border, but separated by Subunit Mb the Dalat Plateau.

The Subregion as a whole high species richness and moderate endemism, with taxonomic affiliations in most groups being closest to the Indian Subregion, then to subtropical China, and thirdly with the Sundaic Subregion to the south.

At a regional level, this scheme is a useful tool and accords reasonably with both Vidal (1960) and Schmid's (1993) map of Floristic Biodiversity Centres. However, a reservation at

finer level concerns MacKinnon's separation of an Annamite Mountain Subunit (Ma) confined to the far southeast of Laos and adjacent Vietnam. Further north in the Annamites, where the mammal fauna is possibly more distinctive, and where an Endemic Bird Area is centred (Stattersfield, *et al.* 1998), they are lumped in Unit 5c with the adjacent, but quite distinct Vietnamese coastal lowlands. In principle, either the whole Annamite range should be treated like this, or else it should be redesignated as a whole and subdivided as necessary. The present treatment is inconsistent.

For use at Lao national level some further refinement is necessary. For example, recognition could be given to a southern, Sundaic element in Unit 10a that ends around Savannakhet (see for example King *et al.*, 1975, for birds). Coastal Indochina Unit 5 on the other side of the Annamites is similarly subdivided at this latitude (c. 15-16^0). For purposes of classifying wildlife records, Duckworth *et al.* (1999) also separate "southern" and "central" Laos at this point, but place another boundary between central and northern parts of the country at about 18^0 (approximately following Route 8), which is well to the south the 10a/10b boundary. They stress, however, that this is basically an administrative convenience pending a formal biogeographic analysis - which they believe would now be possible for birds.

Finally, for many arboreal mammals, the Mekong forms a significant barrier at species level and sometimes genus. Thus, Nam Pouy, in Xaygnabouly province, contains species that are widely distributed in Thailand, but found nowhere else in Laos (e.g. Lar Gibbons), and Dong Kanthoung, a proposed NBCA in the far southwest, contains some Cambodian/Thai elements (e.g. Pileated Gibbons).

More recent biogeographical studies have highlighted the importance of the size, shape and dispersion of protected areas in maintaining viable populations of species (for a review see May 1992). Small populations are prone to extinction from in-breeding depression, random fluctuations in breeding success and other factors. Large, non-fragmented reserves containing varied habitat types offer the best prospects for conservation, particularly for species with wide distribution but low population densities (e.g., large carnivores). Where possible reserves should be linked by corridors along which migration, dispersal and gene flow can occur. Smaller reserves should augment these major reserves by protecting additional habitat types, or unique sites of special interest or importance for breeding.

In the Lao context, the highest, long-term potential lies in two clusters of existing and proposed NBCAs or Provincial Conservation Areas. One is the Khammouane/Bolikhamxay complex of reserves, which includes Nakai-Nam Theun, Hin Nam No, Phou Hin Poun, Nam Kading and proposed NBCAs to the north. These areas total almost 10,500 sq. km., contain a wide range of habitats and are at least tenuously linked. Three of them also adjoin reserves in Vietnam (Pu Mat, Vu Quang and Phong Nha) with a combined area (existing and proposed) of about 2,000 sq km.

The second complex, similar in size but with different habitat and biogeographic affinities encompasses Xe Pian, Dong Houa Sao, Dong Ampham (5,500 sq km) and several proposed areas in the south (Phou Theung, Bolavens NE, Xe Khampo, Bolavens SW and Xe Gong Provincial Protected Area in Attapeu) with a total area of almost 5,000 sq. km. Transfrontier linkages encompass Chu Mom Ray Reserve, in Vietnam and Virachey National Park in Cambodia.

Although neither of these complexes is yet a managed reality on the ground, the concept of landscape-level planning and designation is particularly critical if viable populations of very large mammals, such as elephant, tiger and wild cattle are to be maintained (Duckworth and Hedges 1998).

Biological richness

At a regional level, using a combined total of plant, bird and mammal species, weighted for endemism and land area, MacKinnon (1997) ranks Laos as moderately rich in species. Given the very limited study, particularly of animals, prior to 1990 it is not clear if this adequately reflects the country's true biological importance. The relatively high remaining forest coverage and rapidly expanding species inventories suggest that some upward revision may be necessary.

For both plants and animals, while few species are confined solely to Laos, many others are shared with Vietnam but endemic to these two countries, and especially to the Annamite mountains. Given the much higher population pressure and the low remaining forest cover in Vietnam and Thailand, Laos would appear to be very important strategically for the Indochinese region. This applies both to localized, near endemic species and to others that are widely distributed but at low densities. Elephants, for example, are reduced to a few dozen animals in Vietnam, but remain widely distributed and relatively common in Laos.

Floral lists are based largely on Vidal (1960) who recorded 1446 species in 754 genera, nearly all of which are trees and shrubs. Consideration of known orchids would add another 300 species according to IUCN estimates, but these figures represent only a fraction of the true flora. The flora of Vietnam, for example, is estimated at about 10,000 species, of which 7,000 have been described. Figures for Thailand are similar.

Knowledge of the vertebrate fauna, although greatly improved over the past decade, remains far from complete. Duckworth *et al.*, (1999) cite all vertebrates except fish recorded to date in Laos, together with a complete listing of bird and mammal records for the NBCA and other major survey sites. Fish diversity and endemism are also known to be high in Laos. Paradoxically, knowledge of the fish fauna has recently benefited from several professional surveys undertaken as contributions to assessments of the likely impacts of hydropower projects (e.g. Kottelat 1996).

Invertebrates have hardly been studied at all. Gressit (1970), describing an unpublished study by Jacques Rondon of longicorn beetles, recorded 702 species in the Subfamily Lamiinae, of which 366 (52%) appeared to be endemic – a proportion considered high for this group.

Survey work on both the Lao and Vietnamese sides of the border since the early 1990s has resulted in several exciting new species discoveries, particularly along the Annamite mountains bordering Vietnam. Dung *et al.* (1993) described a new form of bovid, the Saola (*Pseudoryx nghetinhensis*). It is fairly well distributed in everwet forests on the Lao side of the border (Schaller and Rabinowitz 1995). Other discoveries made on both sides of the border include two new species of muntjacs and a new rabbit. Another muntjac and a wild pig species that had not been recorded for many decades were rediscovered on the Lao side of the Annamites (but they probably also occur in Vietnam).

While this belated recent expansion of knowledge makes possible a more scientifically-based assessment of the protected area system, it should be cautioned that almost all the zoological work to-date has focused on vertebrate distribution and taxonomy. Invertebrates remain almost entirely unstudied (with few exceptions, e.g. Gressitt, 1970). More detailed ecological and behavioral studies remain virtually non-existent, and there are no integrated research programmes of the kind that have led to an accumulation of understanding of tropical forest ecosystems elsewhere in southeast Asia (e.g. Marshall and Swaine 1992). Compared with almost all other countries elsewhere in topical Asia, or in Africa and the Neotropics, Lao forest biodiversity remains very little studied and the literature scanty.

Annex 5: HISTORICAL PERSPECTIVE ON BIODIVERSITY IN LAOS

Lao traditions and culture

Biodiversity conservation has a long history in Asia. In the year 252 BC, the emperor Asoka of India issued an edit for the protection of animals, fish and forests, the earliest documented establishment of what today we call a protected area (Gadgil 1989, cited in McNeely 1998). Comparable initiatives occurred in Srivijayan culture in Sumatra, the Moghul Empire of 15th century India and elsewhere. Moreover, nature and man have long been closely inter-related in Southeast Asia, through a diversity of animistic spiritual beliefs, and, more formally, through the tenets of Buddhism (McNeely and Wachtel 1991). Between 1353 and the end of the seventeenth century the Lan Xang monarchs ruled over a Lao kingdom much larger than the country's present borders, and specifically evoked the elephant as a symbol of power and unity (Cummings 1994). To this day, elephants remain revered in Las, both as captive animals and in the wild (Lair 1997).

Elephant culture notwithstanding, Theravada Buddhism presents a paradox in regard to wildlife. The religion enjoins believers against the taking of all life and in some other Buddhist cultures, for example, in Sri Lanka, respect for wildlife is widely manifest. In Lao culture, other strands of Buddhist belief stressing tolerance or else earlier animist traditions have prevailed, for hunting and carnivorous tastes in food appear deeply engrained. Certainly, the present day visitor to Vientiane is struck by the scarcity of urban bird life. This contrasts with most other south and southeast Asian countries where birds generally abound even in some of the most densely populated areas.

After the collapse of Lan Xang in the 18th century, Lao lands became progressively squeezed between the expanding Thai Kingdom to the south and Vietnamese suzerainty over parts of eastern Laos, particularly Xieng Khoang. After the sacking of Vientiane, in 1828, there followed thirty years of punitive expeditions across the Mekong, in which large numbers of ethnic Tais were forcibly resettled into what is now northeast Thailand (Isan). The events of this period may help to explain the generally low population density, limited agricultural development and relatively high forest cover that has prevailed in southern Laos to the present day. Efforts by minority groups to escape Thai and Lao domination at this time may also have made some contribution to the extraordinary linguistic diversity in remote parts of the Annamite mountains, such as in Nakai-Nam Theun NBCA (Chamberlain 1997). It should be noted however, that much of this diversity probably pre-dates the existence any Thai or Lao nation-state.

The era of foreign influence: 1860-1975

French influence in Laos began with the classic travels of Henri Mouhot, which ended with his death near Luang Prabang in 1861 (see Smithies 1995). His posthumously published diaries helped stimulate a large expedition, led by Doudart de Lagree and (after his death) François Garnier, from 1866 to 1868 which explored most of the Mekong from the delta to lower Yunnan, surviving the Muslim Insurrection in Yunnan, and eventually returning to Saigon via the Yangtze River and Shanghai. By any standards this was a remarkable feat. Although the original aim of opening a navigable trade route to central China was quickly dashed by the discovery of Khone Falls and other rapids, the expedition report published a wealth of information on central Indochina (Garnier 1873; translated and reprinted 1996). Some sample references to the abundance of wildlife encountered are given in Box A5.

French "protection" of Laos was formalized in 1896 and there followed a gradual opening up of the country to Western influence. Anecdotal accounts from this period continue to indicate that large mammals, including such modern rarities as rhino and tiger, remained common over most of the country despite the fondness of both the Lao and French colonial officers for hunting.

BOX A-5. QUOTES ILLUSTRATING THE ABUNDANCE OF FORESTS AND WILDLIFE IN LAOS IN THE 19TH CENTURY

Source: Garnier 1873; translated and reprinted 1996

Extent of forest (Delaporte), p. 219*: "Indeed, our whole story could be said to take place in a single unending forest. We entered it in Cambodia, and we were not going to be out of it before we set foot in China, eighteen months later."*

Xe Don, pp. 96 and 98: *"The tranquility of these banks and the silent progress of the pirogue which advanced in to this landscape, encouraged numerous alligators to hang around in the morning sun in this area.. Some peacocks also pecked away on the shores."*

Xe Kong, p. 117: *"According to the Laotian porters, this finest camping point on the deserted banks of the Attapeu river presented some danger because ferocious animals were very numerous in the area".*

Wat Phou (Delaporte), p. 184*: "On all sides, magnificent Antigone cranes flew up, stirring the reeds, when I approached."*

Trade at Bassac (Delaporte**),** p.174: *"The areas in which these savages live lack cotton, tobacco and indigo, but they furnish in exchange for these products, gold dust, Chinese nettle, ivory, wax, hybrid cardamom, rhinoceros horns, peacock feathers and the bones of wild animals. All of these commodities posses a great value in the Chinese market".*

Near Savannakhet, p. 153*: "Suddenly, piercing cries rang in our ears, and in front of me, barely a few metres away, tearing up the foliage with a long jump, a tiger appeared, dragging along a child"…*

Thakhek (Delaporte), p. 218: *"While we proceeded beside the bank, a band of small, bizarrely coloured monkeys descended from branch to branch to the ground and amused use with their skipping and gamboling."*

Phou Hin Poun NBCA (Delaporte) p. 230*: "Our companions had stopped to behold this marvelous sight when they suddenly heard a tremendous rumbling resound and repeat itself in echo after echo until it reached the depths of the arena. A herd of wild elephants, which did not look much bigger than sheep next to these enormous masses which surround them came out of a thicket and appeared on the plain"*

The first modern scientific collecting work in Indochina dates mostly to the period between the two world wars. Osgood (1932) describes the results of four major expeditions to during the late 1920's, which began to reveal the extent of regional endemism among mammals east of the Mekong. Delacour's superbly illustrated guide to the birds of French Indochina is of similar vintage (Delacour and Jabouille 1931) and was an output of a highly productive series of French expeditions. David-Beaulieu, a colonial officer of this period, contributed some important ornithological records for Savannakhet and Xieng Khoang. Oddly enough, neither scientists nor amateur naturalists of this period reported the most dramatic of all Annamite endemics, the Saola, despite the fact that colonial Route 8, linking Bolikhamxay to Nghe An province, in Vietnam, passes through the center of its range. Furthermore, the Pavie Mission traveled extensively in the areas to the north and south of the Song Ca river in Nhge An, and along what is now Khamkeut District of Bolikhamxay. Saola are found in both areas today.

The great majority of French scientific work and the establishment of universities during colonial times was concentrated in Vietnam. One outstanding exception lies in the work of Jules Vidal, whose botanical collecting and ecological studies in the 1950's

contributed a doctoral thesis and monograph entitled *La Vegetation du Laos* (Vidal 1960), which remains the only significant work to date on Lao plant biodiversity. Vidal's forest classification system together with his climatic descriptions and species lists provide valuable elements of justification for the present system of NBCAs.

Elsewhere in Asia prior to World War II the first modern national parks were established, including Mt. Arayat and Mt. Roosevelt in the Philippines (1933), Corbet in India (1938) and Taman Negara in Malaysia (1939). Although Angkor Wat, in Cambodia, had received legal protection as early as 1925, there were no comparable initiatives to protect nature in Laos.

Although Laos became formally independent as early as 1953, political struggle and foreign intervention continued until the Revolution of 1975. In assessing the present status of biodiversity in Laos, the main war years from 1964 to1973 undoubtedly play a pivotal role (for review see Warner 1995). Firstly, bomb damage and defoliants were themselves prime causes of forest disturbance in the main conflict zones. In the south, along the Ho Chi Minh trail, vehicle tracks were often deliberately aligned through primary forest to minimize detection from the air. Paradoxically, some of these areas may now be partly protected by the reluctance of villagers to venture away from paths for fear of unexploded ordinance, which is still widespread. In the north, in Xieng Khoang and Houaphanh, direct impacts on biodiversity were probably less severe, if only because large areas were already deforested. However, throughout the country unexploded bombs have been a common source of explosives for fish bombing (Baird and Mounsoupham 1997).

Devastating as these impacts were over large areas, the most significant consequence of war and its aftermath was the mass relocation of people that occurred throughout the country, which greatly accelerated forest loss (Goudineau 1997). Hunting efficiency also increased with spread of modern automatic weapons, adding to the impacts of simpler muzzle-loading guns, snares and cross-bows.

The importance of hunting as a historic and on-going cause of biodiversity loss cannot be over-emphasized. Chazee (1990) reckons that the large mammal fauna was still largely intact, in the sense that all the known species still occurred in significant numbers, as late as 1940. Since then, and probably within the past two decades, at least two species – Kouprey and Tapir - have become extinct, and perhaps both rhino species (Duckworth *et al*. 1999). As recently as 1989, Chazee (1990) also recorded eight rhino horns being sold in Vientiane and five in Louang Prabang. The collapse of the country's large mammal fauna has thus been extremely rapid, placing the residual populations of several other species under extreme pressure - probably no longer viable in the long term (Duckworth and Hedges 1998)

Recent increases in knowledge

Beginning in 1988, the Department of Forestry, with support from Sida and IUCN, began a survey of suitable areas for conservation. Stimulated by this work has been a rapid expansion in wildlife surveys and in knowledge of the vertebrate fauna of Laos (see Salter 1993; Duckworth *et al*, 1999). Since 1994, the Wildlife Conservation Society has also played a major role in assisting with faunal survey work. This has resulted in several exciting new species discoveries, particularly along the Annamite mountains bordering Vietnam. Dung *et al.* (1993) described a new form of bovid, which they named *Pseudoryx nghetinhensis*, or in English the Saola. This turned out to be widely distributed in everwet forests on the Lao side of the border (Schaller and Rabinowitz 1995). Another discovery made simultaneously on both sides of the border was a new muntjac species, *Muntiacus vuquangensis* (Tuoc *et al.* 1994; Schaller and Vrba 1996; Timmins *et al.* 1998). A wild pig, *Sus bucculentus*, has also been rediscovered (Groves *et al.* 1997).

There has been a large increase in the knowledge of the bat fauna of Laos, due to surveys in the mid-1990s assisted by scientists with WCS.

In contrast to mammals, birds can be surveyed more directly and in the past decade there has been a rapid increase in distribution records (for review see Thewlis *et al.*, 1998). Knowledge of reptiles and amphibians has been a lower priority, but better data have recently come available. A doctoral student working under the auspices of WCS and CPAWM/DFRC, Bryan Stuart, recently completed fieldwork for a thesis on the zoogeography of reptiles and amphibians in Laos.

Knowledge of the fish fauna has benefited from both independent studies (e.g. Roberts, 1993; Roberts and Baird, 1995), and surveys undertaken as contributions to Environmental Impact Assessments for hydroelectric projects (e.g. Kottelat 1996).

While recent expansion of knowledge makes possible a more scientifically-based assessment of the protected area system, it should be cautioned that almost all the zoological work to-date has focused on vertebrate distribution and taxonomy. Invertebrates remain almost entirely unstudied (with few exceptions, e.g. Gressitt 1970). There is also virtually no tradition of forest silviculture on which to build. More detailed ecological and behavioral studies are virtually non-existent, and there are no integrated research programmes of the kind that have led to an accumulation of understanding of tropical forest ecosystems elsewhere in southeast Asia (e.g. Marshall and Swaine, 1992). Compared with most other countries in topical Asia, or in Africa and the Neotropics, Lao forest biodiversity and ecology remains little known.