

I. Biodiversity Profile for Luang Namtha Province

Final version

November 20 2003

A report produced for Science, Technology and Environment Agency and UNDP for the Lao PDR Biodiversity Country Report by the WCS Lao program.

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B Conventions

Common location names include: *ban*: village; *muang*: district headquarters; *nam*: river; *houe*: small streams; *nong*: pool or small lake; *pak*: river mouth; *phou*: mountain or hill; *poung*: natural mineral lick; *hai* hill rice fields.

C Abbreviations

ADB	Asian Development Bank
ADRA	Adventist Development and Relief Agency
CITES	Convention on the Trade of Endangered Species
CPAWM	Center for Protected Area and Watershed management (now DFRC)
DAFO	District Agriculture and Forestry Office
dbh	diameter at breast height
DED	German Development Service
DOF	Department of Forestry
EPL	Environmental Protection Law
ESF	Ecoles san Frontieres
EC	European Commission
FAO	Food and Agriculture Organization of United Nations
FIPD	Forest Inventory Planning Division
FUF	Friends of the Upland Farmer
GDP	Gross Domestic Product
GMS	Greater Mekong Subregion
GOL	Government of the Lao People's Democratic Republic
GPS	Global Positioning system
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit
NH	Nam Ha
NHGA	Nam Ha Guides Association
IRRI	International Rice Research Institute
LANDSAT	Land Satellite Photo System
LUPLA	Land Use Planning and Land Allocation (
MAF	Ministry of Agriculture and Forestry
MCTPC	Ministry of Communications, Transportation, Post and Construction
MRC	Mekong River Commission
MOIC	Ministry of Information and Culture
LNT	Luang Namtha
NARC	National Agricultural Resource Center
NCA	Norwegian church Aid
NBCA	National Biodiversity and Conservation Area
NPA	National Protected Area
NGO	Non-Governmental and Private Volunteer organizations
MPDLC	EU Micro Projects Development Through Local Communities
NPEP	National Poverty Eradication Programme
NTFP	Non-Timber Forest Products
PAD	Protected Areas Division
PAFO	Provincial Agriculture and Forestry Office
PRC	Peoples Republic of China
RCA	Root Cause Analysis
Sida	Swedish Bilateral Assistance
SPOT	SPOT Satellite Photo System
STEA	Science, Technology and Environment Agency
UNDP	United Nations Development Program
UNESCO	United Nations Education Science and Culture Organization
USD	United States dollar
IUCN	World Conservation Union
WCS	Wildlife Conservation Society
WD	Watershed Division
WWF	World Wildlife Fund

II. General Information

A Geography

Luang Namtha is one of the northwestern-most provinces in the Lao PDR. Its size is 932.5 km². To the northwest the province is bounded by Myanmar and to the north by the Xishuangpanna region of China's Yunnan Province. To the southwest it is bordered by Bokeo Province and to the south and east by Odomxay Province. There are five districts in the province: Luang Namtha, Nale, Long, Sing and Vieng Phoukha (see Map 1).

B Population and Infrastructure

1. Demographics

Lao PDR

The population of Lao PDR in 2000 was 5.3 million or an average population density of 22.9/km² (GoL 2000). This is the lowest population density in the region, nearly three times less than the next least-populated country Cambodia (66.3) and less than a tenth that of Vietnam (241), the most densely populated. The population density of Thailand (121) and Yunnan China (106) is about five times that of Lao PDR. The national population is 49.45 % male and 50.48 % female. The total number of households is approximately 752,000 with an annual population growth of 2.5 percent. Household (HH) size in Lao PDR is large with little variation between rural and urban areas. The average household size is 5.9 persons for urban areas, and 6.1 persons for rural (UNDP 2002).

Luang Namtha Province

The overall population of Luang Namtha Province is 136,000 or 14 persons per km². That is lower than the national average. Its growth rate since the 1995 census has been 2.5%. The majority of the population is rural, living in villages of about 100 to 1,000 people. Agriculture is the primary employment activity, with much of it at a subsistence level.

The population by district is shown in Table 1. Luang Namtha has the largest population and the largest town. The population of each of the districts has grown since the 1995 census. There does not appear to have been a marked trend towards urbanization in Luang Namtha municipality (11,742 people); however, it is difficult to quantify urban growth as the designations for which villages are considered part of a municipality are not always clear and may change over time.

Table 1. District Population. Source GoL 2000

District	1995 Population	2000 Population
Luang Namtha	35,408	43,419
Sing	22,467	27,975
Long	21,357	24,809
Vieng Phoukha	14,871	16,208
Nale	20,638	24,450

2. Industry

There are presently few medium-to-large size industries in the area. Provincial planning envisions a future with more industries, especially related to the agricultural sector (LNT 2002). The Luang Namtha Provincial Industry Department has defined an industrial zone just outside of town on the south side of the road from Luang Namtha to Vieng Phoukha on Route 3. Many small-scale "cottage" industries exist throughout the province, making goods such as cotton and silk textiles and other handicrafts, processing agricultural goods and non-timber forest products, and making furniture and other household goods.

Luang Namtha District has five stone crushing factories. Three are to the north in Ban Tintok and two are in Ban Poulan. One of these is in the National Protected Area (NPA). There are two motorcycle assembly plants, a Lao-owned one in Ban Tintok and a Chinese-owned one close to Luang

Just south of Vieng Phoukha municipality there is a factory processing aromatic wood, *mai khetsana*, to make perfume. Collection of *mai khetsana* has temporarily stopped until further assessment can be made of sustainable harvest levels. The district hopes to attract a company with a plan to domesticate *mai khetsana* and undertake rural development at the same time.

3. Water and Sanitation

Water

Luang Namtha municipality has piped water systems connected to most businesses and many homes. There is no water system in Vieng Phoukha municipality where villagers bathe in the not-very-clean Nam Chouk River, and carry water from the river for household use. The Adventist Development and Relief Agency (ADRA) project established a water supply system at one time; but it no longer works. The district hopes to find funding for building a reservoir on top of the hill behind Ban Tio. Then water could be pumped from the river to the top of the hill and a gravity water system could be installed using the reservoir. Most of the villages along Route 3 in Luang Namtha and Vieng Phoukha Districts also have piped water systems, usually provided with support from international aid agencies. Villages more distant from the roadway are reported to be largely without piped water. For the whole province the percentage of households with piped water or a protected well is 27% (UNDP 2002).

Sanitation

Luang Namtha municipality businesses and households have plumbing systems draining into septic tanks. Others have pit toilets. Outside of Luang Namtha Municipality, villages vary in the percentage of homes with latrines. Several NGOs in the area have programs providing squat toilets, cement, and technical assistance for the installation of sanitary waste systems, with varying degrees of success. Several non-governmental and private volunteer organizations (NGOs), in coordination with the Lao Women's Union, carry out health education activities in nutrition, hygiene, and sanitation. Sewage from Luang Namtha that ends up in the Namtha River flows past Nam Ha National Protected Area only on its eastern boundary.

Luang Namtha municipality has a landfill site and privately owned, fee-based garbage collection service. In the villages and in Vieng Phoukha municipality there are no comparable services and many people just dump their garbage behind their homes or into the same rivers where they also bathe and get their water for drinking and household use. District officials have made some efforts to get people to adopt more sanitary habits, with limited results. There is not a great deal of inorganic garbage, because people do not have a lot of disposable goods to throw away. This may change as road development brings more plastic to the area.

For the whole province the percentage of households without a toilet is 71% (UNDP 2002). The provincial Public Health Departments, the Red Cross, the Lao Women's Union, and various NGOs carry out sanitation information campaigns. Health educators use translators in the ethnic villages, where most people do not speak Lao. ADRA has been working water supplies and sanitation in Luang Namtha, Sing and Vieng Phoukha districts since 1994. The EC Micro Projects Development Through Local Communities (MPDLC) Program will provide selected communities with clean water supply systems and basic latrines. The most commonly used and suitable systems are gravity supply pipe systems and rainwater tanks. The program will also review and test feasible alternative systems for villages with no access to streams.

4. Markets

There are daily morning markets in all the district capitals, offering a variety of local agricultural produce and non-timber forest products (NTFPs). The markets have several shops carrying clothing, office supplies, hardware, and other consumer goods. In many cases these shops are owned and run by people from China. Several villages (for example, Thong Seng Chan, Nong Kham, Don Chai, Nam O) have markets that open weekly or monthly, attracting buyers and sellers from neighboring villages. Nine percent of the villages in Luang Namtha Province have permanent markets (UNDP 2002). At Boten there is a large border-trading zone planned with buildings already under construction.

5. Electrical Infrastructure

Seven percent of the villages in Luang Namtha Province have electricity (UNDP 2002). Since April 2003, Luang Namtha and Muang Sing municipalities have been supplied power from a transmission line from the Peoples Republic of China (PRC). Electrical lines stretch south of Luang Namtha municipality as far as the village of Ban Nam Leu.

Vieng Phoukha municipality has a diesel generator that operates between the hours of 6 p.m. and 9 p.m. District officials report that the generator breaks down frequently. There is a new power line for the generator, but most houses do not have electrical tie-ins yet. The town telephone runs off of solar power. There are no plans in the near future to bring Chinese power down as far as Vieng Phoukha District although the long-term national electric grid plans show a power line following Route 3 from Luang Namtha to Vieng Phoukha.

A small hydropower facility is being built on the Namtha River about three kilometers outside of Luang Namtha municipality. Along with electricity production, the dam will divert water to the Luang Namtha Plain for dry season irrigation.

The Min Sivalay logging company did a survey for a 700-kw. dam, costing US\$4.8 million, on the Nam Fa River east of Ban Nam Fa and south of Vieng Phoukha municipality, at Ban Nam Kieng. The Vientiane Times recently announced that a contract has been awarded to an Australian company to build the dam.

6. Transportation

Compared to the rest of the country, Luang Namtha is one of the most isolated provinces in Lao PDR in terms of overall provincial accessibility. Forty-two percent of the villages are 6+ km. from a main road. In the dry season, 44% of the villages have access to a main road, but in the rainy season only one third (32%) of the villages can be reached. Twenty-five percent of the villages have scheduled passenger transport (UNDP 2002).

Lao Airlines operates daily, non-stop, roundtrip flights from Vientiane to Luang Namtha Airport on Chinese built Y12 aircraft year round. There is also twice-weekly service from Luang Prabang and Houei Sai. The Government of Lao (GOL), with a loan from the Asian Development Bank (ADB), is planning to extend the runway to allow the larger French built ATR to land, and to improve the airport in the near future.

During the rainy season it is possible to reach Luang Namtha via the Namtha River from the Mekong River also; however, this mode of travel is disproportionately expensive. On the Mekong, boats travel down river from Xieng Kok to Houei Sai and on to Luang Prabang.

The road from Luang Namtha municipality to Oudomsai was improved in 1997, as have the roads to Muang Sing and southwest from there to Xieng Kok on the Mekong River. Buses and pick-up trucks with bench seats travel to Luang Namtha from Houei Sai, Muang Sing, and Oudomsai. Route 17 from Muang Sing to Xieng Kok was improved in 2000 with the assistance of a World Bank loan, but it is not sealed. The road from Luang Namtha municipality to Muang Sing municipality was resealed in 2002.

In Luang Namtha municipality, there are paved roads in the central part of the new town. Three-wheeled tuk-tuks serve as taxis. There are noticeably more motorcycles and fewer bicycles in Luang Namtha than there were in 1995. There seem to be more pick-up trucks and Sport Utility Vehicles as well. Tractors pulling passenger carts are still in evidence within the town and along the outlying roads. Small fishing boats ply the Namtha River. Tourists can rent bicycles or motorbikes. They can trek or tour by inflatable rubber raft.

Several national and international projects are underway to improve road access in Luang Namtha Province. The EC-MPDLC Program will continue to improve access for remote villages through simple tracks that are constructed mainly with village labor, supported by limited input from local construction companies. The Program will assist districts in prioritizing, designing and implementing the construction and upgrading of such tracks. The Program will assist district and communities in monitoring and evaluating positive and negative impacts of rural tracks. Where negative impacts occur, the Program will assist in the design and implementation of effective mitigation measures.

The ADB Northern Economic Corridor Project is scheduled to start soon and will be completed by the end of 2005. The primary goal of the project is to facilitate trade and investment in this portion of the Greater Mekong Subregion. An improved road link between the PRC and Thailand via the Lao PDR will reduce transport costs in the region, and increase the efficiency of the movement of vehicles, goods, and people. The area indirectly influenced by the project covers a population of about 42 million in the immediate provinces in these three countries. The project includes improvement of the existing road in the Lao PDR linking Yunnan Province in PRC with Chiang Rai in Thailand, thus creating an international north-south corridor. The project has mobilized resources worth nearly \$60 million from Thailand and the PRC with the Lao PDR contributing \$30 million through an ADB loan. Lao communities will also benefit from enhanced community infrastructure resulting from the project (ADB).

While the effects of improved road access are mostly positive, previous projects have shown a number of negative effects as well, e.g., increased rate of accidents, drug abuse, migration, sexually transmitted diseases and increased wildlife trade. While the livelihoods of the people in the area could be greatly enhanced by improved access, there is still a great risk that livelihoods could be made worse if the environment on which people depend is subject to overexploitation.

7. Health Care

Access to medical care in Luang Namtha Province is limited. Only thirty-three percent of the households have access to primary health care. For 9% of the households, a hospital is 6+ km. away. There are hospitals in each of the district capitals and clinics in a number of villages. Eighty-seven percent of the villages have a pharmacy and an immunization program (UNDP 2002). Most villages have a village health volunteer and some have a nurse. Hospitals are reputed to be understaffed and without many essential resources. Impoverished villagers are sometimes unable to afford medicine, even when it is available in local clinics. The provincial Public Health Departments, the Red Cross, the Lao Women's Union, and various NGOs carry out public health campaigns. Health educators use translators in the ethnic villages, where most people do not speak Lao. Campaigns offering affordable, chemically impregnated mosquito nets have had a significant impact in reducing malaria and dengue fever, but these diseases are still common.

AIDS prevention is of key concern in relation to the potential impact of improved road access to Thailand and China as part of the ADB Northern Economic Corridor Project and increased international tourism. The Lao Red Cross has HIV/AIDS prevention educational programs in Luang Namtha Province, supported by the Australian Red Cross. These programs are able to cover two or three villages per month, and as of March 2002 had carried out HIV/AIDS workshops in about one third of the villages along Route 3. CARE delivers AIDS education to workers in entertainment venues in Houei Sai. Norwegian Church Aid provides HIV/AIDS education in the villages in Long District.

In the absence of regular health services, rural households mainly rely on traditional health care practices. Many of these are effective, low-cost local solutions to a range of common ailments, which should be identified and promoted. ADRA has been working with upgrading the long term village health system since 1994 in 18 villages in both Namtha and Vieng Phoukha districts. They have focused on malaria prevention, village health volunteer training, establishment of village revolving medical kits for basic medication, hygiene awareness and disease prevention. EC-MPDLC Program will assist local communities in recognizing the value of their local healers and provide opportunities for local healers to exchange and disseminate their knowledge. The program will also promote co-operation between local healers and district health services. The program will improve the logistics of primary health care to remote villages, combining roving teams of district health workers with trained village health workers from among ethnic minority groups. The program will support the upgrading of sub-district health posts, where feasible, and provide training opportunities for district health staff to become better prepared to provide curative health care, especially to ethnic minority groups and women.

Last but not least, the program will support district health services to adequately tackle epidemic diseases such as malaria, aids and drug addiction through special campaigns. These campaigns will mainly focus on awareness raising, but may occasionally be stretched further to include prevention, e.g., through treatment of mosquito nets as well as curative measures, e.g., finding effective drug detoxification programs for drug addicts from ethnic minorities. For malaria, these activities will build on the results of the on-going EC malaria reduction project.

8. Education

Adult literacy rates for women and men in the Northern Region remained lower than in the other regions. Less than one third of the Northern schools have a complete primary cycle, compared to half in the Southern region. This makes educational advancement for Northern children inordinately difficult. The adult literacy rate (% age 15 and above) for Luang Namtha Province is the lowest in the country, 32.5%, versus 60.2% for the whole country. The literacy rate for women, 17%, is one-third of that for men, 51% (UNDP 2002). A close examination of the 20-24 age group reveals that 30 percent had had no education, and another 21 percent had not completed primary school. Girls tended to go to school for only 2-3 years, thus even in this young group, 44 percent of males and 57 percent of females may be considered to be functionally illiterate.

Most of the villages in Luang Namtha Province have elementary schools; however, 52% of the primary schools do not offer the complete five-year cycle. In 1999/2000, 58.6% of the children were enrolled in primary school. Secondary schools are found in the district capitals and Ban Nam O and in a few other villages. In 1999/2000, 32.3% were enrolled in secondary school. There is also a teachers' training college in Luang Namtha municipality.

There is a need for more trained English speakers, especially with the growth of the tourist industry. English language lessons taught by native speakers are not available in the area. In 1997 a volunteer American English teacher from the Volunteers in Asia program taught in Houei Sai. In 2000 a UNESCO project provided an English teacher for tour guides. Similarly, computer training is also needed. Computer literacy is currently taught through employment agencies, and the computer shops in Luang Namtha municipality are beginning to offer lessons in personal computer use.

Ecoles sans Frontieres (ESF) specializes in training teaching techniques in the non-formal education sector. Its emphasis is on literacy of ethnic minorities. In its second phase of activities in Luang Namtha Province it plans to work intensively with 20 teachers from each district. Follow-up teams will work with these teachers after the training. With respect to environmental education, ESF is launching an "urban environment theme". There will be books, posters and games along the lines of the other ESF material. These themes, however, do not address issues of wildlife or protected areas. ESF is also launching a mobile library in 20 villages in Namtha District. In 1999, ADRA began providing primary and non formal education support to 12 villages in Vieng Phoukha District.

The EC-MPDLC Program will not devote much of its effort to formal education. The activities of the program in formal education will be limited to upgrading school buildings in ethnic minority villages and the introduction of simple life-skills training packages among primary teachers, e.g., basic health education materials. The main focus of the education component will be on non-formal vocational training. The program will focus primarily on improving participation in vocational training for ethnic minorities and women. It will identify vocational training opportunities, support and enhance existing training facilities and co-operate with other agencies to build new facilities, where needed and feasible. Learning new vocational skills is one step; it is quite another step to apply them in daily life, both for subsistence and for new livelihoods and small enterprise development. The program will seek co-operation with other organizations to design and implement training and monitoring schemes to support trainees who pass vocational training to use their new skills. This activity may partly overlap with the activities to promote partnerships between the private sector and communities and the activities aimed at promoting sustainable income generation. A proposed new EC project is being formulated to support formal education in Luang Namtha Province.

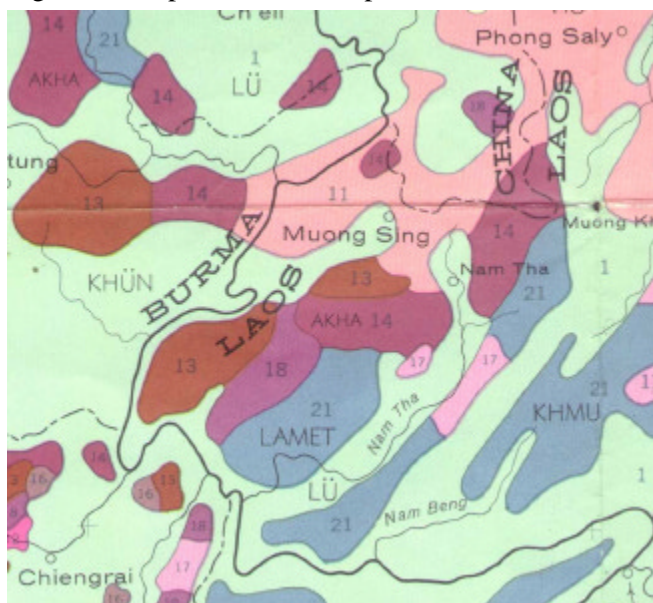
9. Communication

Muang Sing and Luang Namtha municipalities have domestic and international telephone service through the Lao Telecom system. Luang Namtha municipality has public telephone offices, public telephone booths, and private and mobile telephone service. It also has Internet capability through one small Internet café. Phone and Internet services are not yet fully reliable and tend to be quite slow and expensive. Vieng Phoukha District has one telephone at its headquarters. The office is open during regular working hours from 8 a.m. to 4 p.m., though hours are flexible in the event of an emergency. The telephone runs on solar power and works best in the late afternoon on sunny days. The connection is through Bokeo Province, so calls within Luang Namtha are considered long distance. Muang Long and Nale have radiotelegraphy connections, a combination of radio and telephone linkages.

C Cultural Features

1. Ethnic Groups

Figure 1. Map of Ethnic Groups. Source: LeBar 1964



Ethnic Name and (Linguistic group)

1	LU/Leu (Thai)
11	13 Lato / Lahu (Tibeto- Burman)
14	Akha (Tibeto- Burman)
21	Khamu/ Lamet (Mon-Khmer)
17	18 Yao (Miao-Yao)

Lao PDR is an ethnically diverse country of over 47 ethnic groups. The national statistics show; Phu Thai (12.36 %), Khmu (10.91%), Hmong (6.47 %), Leu (2.88%), Katang (2.03%), Mahkong (1.97%), Kaw or Akha (1.64%) Souei (1.37 %) and Nhuon (0.95%). More than 37 other groups collectively comprise the remaining 8 %. (Chagnon 1996).

Most of the population in Luang Namtha Province is made up of ethnic minorities (See Figure 1). Thirty-three percent of the people are considered lowlanders, 29% uplanders, and 38% highlanders. These categories are roughly determined by ethnic-group residential preference. Ethnic groups include Lao Leu, Thai Dam Lao Thueng, Lao Hoi, Kui, Hmong, Khamu, Lamet, Akha, Lanten, Yao.

2. Gender Issues

Women head 11.0 percent of households in the country, and 14.6 percent of urban and 10.3 percent of rural households. The traditional patterns of matriarchal local residence of daughters and bilateral inheritance imply more gender equity than in many other societies, although many women continue living in traditional marriages, where men are *de facto* household heads (Kirjavainen 1999).

Ethnic minority women and girls represent 49.5 % of the female population of Lao society and are clearly the most disadvantaged. They perform 70 % of the agricultural and household tasks, have little access to laborsaving devices and annually lack rice for about three months. They are the majority of the poorest quintile. Their infant and child mortality rates are some of the highest in the world – one out of every four infants dies before age one, and three out of twenty children do not reach five years of age. Their exposure radius – the farthest distance these women travel from home - is about 20 kilometers. Many have never seen the nearest district town or market. They comprise the largest segment of illiterates (about 70 %), non-school attendees and primary school dropouts, usually leaving after grade one or two (Chagnon 1996).

3. Migration

Migration studies reveal that the population is not particularly mobile although there is a notable internal migration of men to the Vientiane area, other municipalities and abroad. Recently, also, young rural women began moving to work in the textile industries in the city areas, both in Lao PDR and Thailand. This

is also reflected in the situation of women, children and elderly remaining in the rural areas, as their work loads and responsibilities for food production and farming are increasing, hence “feminization and graying of farming” (Kirjavainen 1999).

D Legal Framework for Biodiversity Management

In October 1993, the government of the Lao PDR established eighteen National Biodiversity Conservation Areas (NBCA)¹ by decree of the Prime Minister’s Office (PMD 164). Systematic planning for this protected area network had been initiated in 1988. The objective was to protect significant, and representative cover of each major natural habitat type in Lao PDR (Berkmüller *et al.* 1995; Salter and Phanthavong 1989; Salter *et al.* 1991). In 2001 the English translation for NBCA was officially changed to National Protected Area.

The management of protected areas involves three tiers of government: central or national, provincial and district; and third, village. Three important pieces of legislation describe the responsibilities of the different levels. Forestry Law 164, Ministry of Agriculture and Forestry (MAF) 0254 and the PM’s Decree (01) on Decentralization. These state that the Central government is represented by the MAF, through its Department of Forestry (DOF), within that is the Division of Forest Resource Conservation. The latter is responsible for general policy matters and coordination. Provincial and district agriculture and forestry offices exercise management at the lower levels. Villages are responsible for implementation of activities. In addition, Science, Technology and Environment Agency (STEA), under the Prime Minister's office, has a mandate to provide cross-sector coordination, and it is responsible for Lao PDR's role in international conventions to which it is a signatory (See Table 2).

The Division of Forest Resource Conservation has a critical role as the national focal point for biodiversity conservation. It has two technical components: Protected Areas Division and Watershed Division. Protected Areas Division functions are:

- ?? To provide advisory services to the government on matters relating to biodiversity conservation.
- ?? To establish and refine the NBCA system.
- ?? To provide advisory services to local authorities and field staff for management planning and implementation
- ?? To monitor management implementation.
- ?? To acquire and analyze survey data, and prepare statistics needed for conservation planning and monitoring.

Table 2. National Laws and Decrees

LEGAL INSTRUMENT	AGENCY	KEY PROVISIONS
Environmental Protection Law (EPL) No. 02/NA/99 (1999)	STEA	Defines environmental protection duties and responsibilities.
Regulation on Environmental Assessment in the Lao PDR (2000)	STEA and all line ministries	Establishes uniform environmental assessment requirements and procedures. Lays the foundation for line ministries to develop EA regulations for projects in their sector.
Manual of Environmental Impact Assessment Procedures for Road Projects in the Lao PDR (1997, Approved)	MCTPC	Serves as an interim document guiding EIA procedures for road projects. Outlines potential impacts and suggests mitigation measures.
Environmental Guidelines for Road Projects (1999, Draft)	MCTPC	Serves as an interim document guiding incorporation of environmental protection into road project preparation. Establishes a “Code of Sound Environmental Practice.”
National Law on Land – National	Department of	Land acquisition and compensation procedures for

¹ The English translation for NBCA was officially changed to National Protected Area (NPA) in 2001.

Assembly (1997)	Lands	resettlement.
Preservation and Management of National Cultural Heritage – Notice No. 943 (1995)	MOIC	Secures protection from removal, destruction, or alteration of heritage sites and artifacts.
National Forestry Law No. 01-96 (1996)	MAF	Defines forests. Sets forth protection, management responsibilities, and use rights for forestland.
Order 54/MAF For the Customary Rights and Use of Forest Resources. (1996); followed by recommendations 377/MAF on the Customary Use of Forest Resources (1996)	MAF	Secures legal right for local people to use forest resources for subsistence, including hunting and fishing of non-protected species.
Regulation of the Management of National Biodiversity Conservation Areas (NBCA), Aquatic and Wild Life – No. 0524 (2001)	MAF, Forestry Department	Outlines regulations on the establishment of National Biological Conservation Areas (a.k.a. National Protected Areas) and their management. Prohibits fishing and hunting of restricted species, except for scientific research and experimentation. Prohibits export and import of both restricted and controlled species, except for scientific research and experimentation, and as MAF-approved gifts to foreign guests. Prohibits off-season hunting of controlled species. Prohibits commercial exploitation of restricted aquatic species and all “wild” species. Prohibits the use of “exterminating” hunting methods such as explosives and poisons.

1. International Agreements

The Lao PDR participates in the following environmentally-related international agreements and partnerships:

- ?? Kyoto Protocol to the United Nations Framework Convention on Climate Change;
- ?? Convention on Biological Diversity;
- ?? FAO Tropical Forestry Action Plan;
- ?? United Nations Development Program Country Cooperation Framework;
- ?? UNESCO Natural World Heritage Sites membership;
- ?? International Plant Protection Convention;
- ?? Plant Protection Agreement for Southeast Asia and the Pacific;
- ?? Agreement for Sustainable Development of the Mekong River Basin;
- ?? IUCN, membership in the World Conservation Union; as well as
- ?? Cooperation with numerous government organizations, NGO’s, and lending institutions.
- ?? Lao PDR has yet to sign the Convention on International Trade of Endangered Species of wild fauna and flora (CITES). The country is reportedly moving in the direction of signature.

2. Long-term strategies

The following GOL strategies guide long-term planning of biodiversity in Lao PDR.

- ?? National Poverty Eradication Program (GoL 2003)
- ?? National Forestry Strategy to 2020 (draft 2003)
- ?? National Environment Strategy to 2020 (GoL 2002)
- ?? National Biodiversity Strategy and Action Plan Lao PDR has to complete

III. Biogeography and Land use

A Topography

Eighty-five percent of the land area in Luang Namtha Province is considered mountainous. However, there is a wide variety of terrain in the province from towns surrounded by broad, flat plains cultivated with rice paddies, to narrow valleys and rolling hills. Mountain ridge and valley formations follow a NW to SE orientation formed by sedimentary rocks and folded due to batholithic intrusions. The province ranges in elevation from about 300 meters at Xieng Kok to an unnamed peak of 2,094 meters approximately twenty-five kilometers northwest of the town of Vieng Phoukha (see Map 2).

B Geology / Soils

1. Soil

The soils of northwest Lao PDR remain largely unmapped, and detailed data is not available. In general lowland soils vary from hydromorphic types with medium clay content to lighter, loamy soils. The rich alluvial clays of wide river valleys are ideal for wetland rice paddies. Loamier, more porous soils tend to be found in the smaller watersheds. Upland soils are of two main kinds. The first is made up of reddish-brown laterite, more deeply weathered and only slightly acidic. Though not very fertile it is stable and capable of retaining water and permitting swidden agriculture. The second type is a medium to heavy-textured, reddish-yellow podsols that is derived from acid parent rock. This soil has poor water retention, low fertility and little organic content. These soils are easily eroded, so cultivation on these slopes yields little success. Soil depths vary depending on location, slope, and the extent to which they have been subjected to forces of erosion.

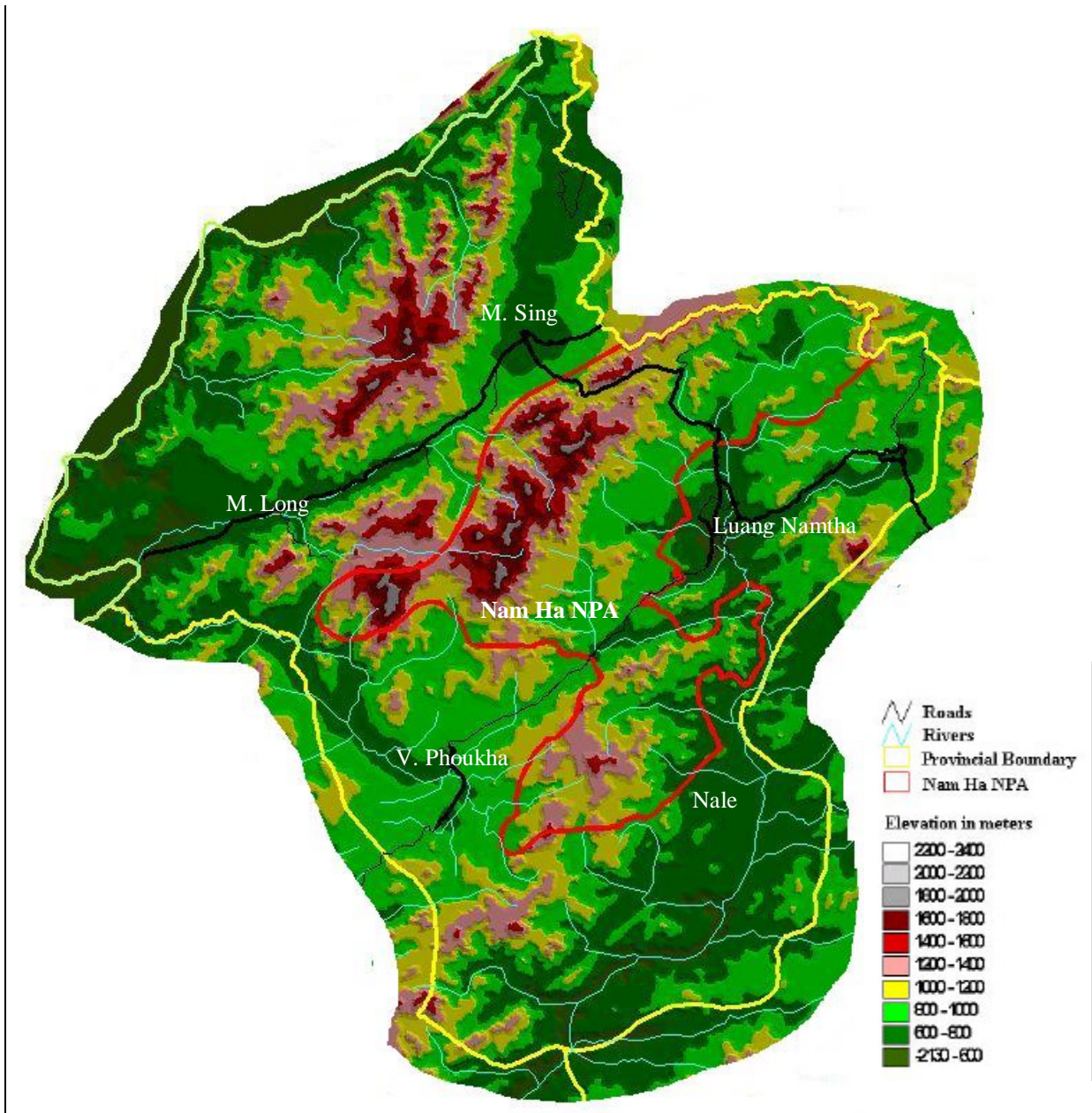
Tropical soils under forest cover generally recycle nutrients quickly, such that most of the existing nutrients are found in the vegetation. As a result, when upland areas are cleared of vegetation, it takes up to 15 or 20 years for soils to recover their fertility. Upland soils that have been deforested are easily eroded.

2. Geology

Pendleton (1962 in Anderson 1993) reports there has been no significant volcanic activity in the recent geologic history.

Underlying the soil of the region is older bedrock consisting of Carboniferous-Permian siltstones, conglomerates, limestone and Permian-Triassic rhyolites, tuffs, and siltstones. (Pendleton 1962 in Anderson 1993). There are also Carboniferous deposits of low-grade lignite. Newer rock formations include Jurassic rhyolites, sandstones, and claystones. The most recent formations are the Quaternary boulders, pebbles, and gravel, as well as minerals broken down into laterite, sand, silt, and clay soils. The rhyolites and tuffs are of volcanic origin. Sandstones, siltstones, and claystones are sedimentary. Red conglomerate, consisting of sandstones, siltstones, and shale, found along roadsides in the steep cuts on the road from Ban Nam Ngeun to Ban Phoung, is highly to extremely weathered, very crumbly, and easily broken by hand. Main outcrops consist of granite of early Mesozoic origin; also there are hard, nearly vertical oriented limestone outcrops of Ordovician time. Limestone ridges are concentrated in Vieng Phoukha District, especially around the villages of Nam Fa, Nam O, Nam Eng, Nam Sing, and Phoulan. The cliffs have numerous caves that provide important habitat for bats and other wildlife.

Map 2. Elevation Map for Luang Namtha Province



C Meteorology / Hydrology

1. Climate

Webster (1981 in Anderson 1993) summarized that meteorological events in SE Asia are mainly influenced by the southwest and northeast monsoon air masses. The influence of the Indian Ocean causes southwest winds to be wet. Whereas the northwest winds from China tend to be dry. The two seasons are interrupted by transition seasons that are hot, dry and stable. Additionally, the mountain ranges have an effect on local precipitation, with the windward sides of mountains receiving heavier rainfall than the leeward sides. Yearly rainfall in the area averages around 1,800 to 1,900 millimeters with variations from year to year ranging from 1,400 to 2,400 millimeters. Figures 2 and 3 show the average monthly rainfall and temperature for Luang Namtha Airport as obtained from the Department of Meteorology. Regular collection of data has just begun in Vieng Phoukha, but we were not able to get the data at the time of this writing.

Luang Namtha Provincial Profile

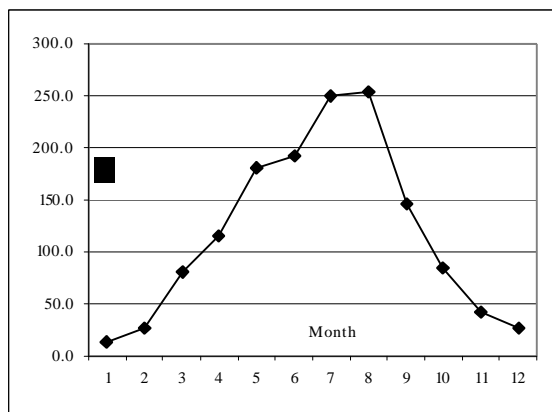


Figure 2. Average rainfall in mm from Luang Namtha from 1984 to 2001

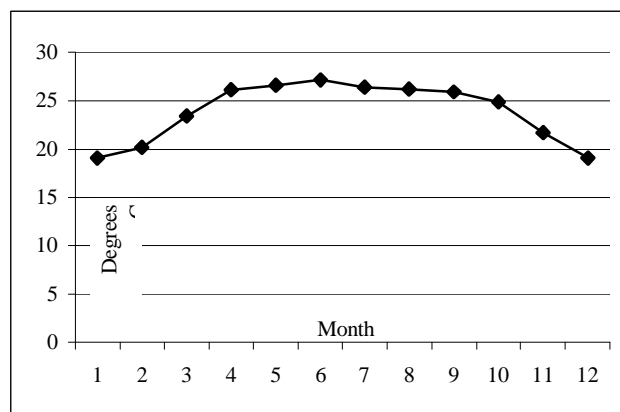


Figure 3. Average temperature in °C from Luang Namtha from 1995 to 2001

Webster further reports, however, that there are fluctuations in the monsoon pattern and droughts and floods are common, but that agriculture and cultural practices are conditioned for rains to start in May and last to October.

The cool dry season is from November to February; the hot dry season from March to April. Relative humidity remains high throughout the year, averaging about 60 - 75% in the dry season and 75 - 85% in the rainy season. Average temperatures in the hot season range from about 25 to 30 degrees centigrade. Average cold season temperatures range from 10 to 25 degrees. The hottest recorded temperature in the project area is 38 degrees. The coldest recorded temperatures in the area occurred in December of 1999, with lows of 0.5 degrees centigrade in Luang Namtha and temperatures at higher elevations below zero, causing frost damage to agricultural crops.

2. Rivers

The rivers that flow through the Nam Ha NPA are an important resource to the people of Luang Namtha Province. They provide a wide range of aquatic resources for subsistence and trade, as well as water for drinking, bathing, and crop irrigation. The importance of water is reflected by the fact that many of the towns and villages of the area are named after the rivers that flow through them.

The entire Nam Ha NPA is part of the Mekong River watershed. Major tributaries to the Mekong include the Nam Tha on the northeast side, the Nam Pha on the south side, and the Nam Mo on the northwest side. The Nam Tha flows roughly to the southeast and joins the Mekong in Odomxay Province at Pak Tha. The Nam Pha flows to the northeast joining the Mekong just south of Xieng Kok. The Nam Mo flows to the east joining the Mekong north of Xieng Kok. The Nam Ha flows through the center of the protected area in a northeasterly direction joining the Nam Tha near Hattat. On the south side of the protected area is the drainage of the Nam Ngao. This river flows to the southeast in the vicinity of Route 3, joining the Mekong north of Houay Xai. Bokeo Province villagers report problems of excessively low water in the Nam Ngao during the dry season and flooding in the rainy season. The Nam Ngao's hydrological imbalance is considered to be the result of Luang Namtha Province's logging in the river's headwaters just south of the Nam Ha NPA and the Vieng Phoukha Coal Mine that dumps spoil into the river.

3. Ground Water

In lowland areas in Luang Namtha Province, the water table is very shallow and in many places water comes to the surface during the rainy season. This phenomenon is essential to the local economy because it allows for wet paddy rice production in these areas. Deforested hillsides are quickly eroded however, and areas downstream experience flash floods during the wettest parts of the rainy season in July and August. During the dry season most lowland areas must be watered or irrigated to produce crops. Groundwater in the province is not suitable for drinking. The reason for this is not clear; but there is the possibility that groundwater has been contaminated by overuse of rat poisons.

D Biogeography

Luang Namtha Province and northern Lao PDR lays at the intersection of the Indochina and Himalayan bioregions. The intersection of these two major bioregions results in high biological diversity. The World Wildlife Fund (Wikramanayake *et al.* 2002) calls this region the Northern Indo-china Subtropical Forests - Ecoregion 74. Holdridge (1971 in Anderson 1993) classifies northern Thailand and northern Lao PDR below 1000 m. elevation as Subtropical Moist Zone and forests above 1000 m. as a Subtropical Lower Montane Belt including Wet and Rain Forest Zones.

1. Vegetation types

Disagreement exists concerning the names used to describe the various vegetation types of Northern Thailand and Lao PDR. Most scientists agree that the general term monsoon forest is appropriate (Schimper 1903 in Anderson 1993); however, subdivisions within this classification vary. Many botanists have proposed two major groupings – deciduous and evergreen for forests, with various names for the different mixtures of these two components based on elevation (Anderson 1993). No floristic studies have been completed in Luang Namtha Province. During 1956-60 Vidal produced the most authoritative descriptions of Lao forest habitats available (in Rundel 1999). Also, Xu did a detailed study in Odomxay Province in 1994 as part of a feasibility study for a botanical garden (in Rundel 1999). Much of the understanding of vegetation of the Luang Namtha Province is drawn from work done in northern Thailand, that is about 100 km away. In 2002 a forest inventory was completed for the Nam Ha NPA (Hedemark 2003). For this field survey, classifications of forest groupings were described using Gardner *et al.* (2000). Some of the results of that survey are reported in Section V.A. of this document.

Historically, subtropical broadleaf evergreen forest once covered much of the area (Wikramanayake *et al.* 2002). Lower-elevation broadleaf forests (up to 800m) appear to represent a transition from wet evergreen lowland forest to montane forests. In pristine forests, the canopy would have been three-layered with the upper crown reaching about 30m in height. At elevations of 800-2000m a montane evergreen forest takes over, with low temperature conditions eliminating most of the tropical forest components. Currently, these forest types are poorly studied in Lao PDR and unfortunately little of the pristine broadleaf evergreen forest remains as it has been replaced with a mosaic of secondary habitat.

E Landuse

The Mekong River Commission has classified forest types and landuse in the Greater Mekong Subregion. Thirty classes were differentiated from 1997 Landsat TM Satellite Images (the latest data available) at a resolution of 1 km². Forest types were mapped with a high degree of detail. Major forest types were sub-divided into crown density classes, where appropriate. Other (non-forest) land cover types were mapped with a lesser definition, e.g. there is only 1 class of permanent agriculture, which contains rice fields as well as agricultural plantations. Map 3 shows the forest and land classification for Luang Namtha Province. Table 3 shows the area and percent of each forest or landuse. If we group all native forests (class code 13 to 19) together, we find that 30% of Luang Namtha Province is native forest, 60% is showing sign of human alteration either in regrowth or woody- shrub land or grassland and 10% currently being used for agriculture (see Figure 4).

Map 3 Luang Namtha Province landcover Source: MRC 1997 data. Source MRC

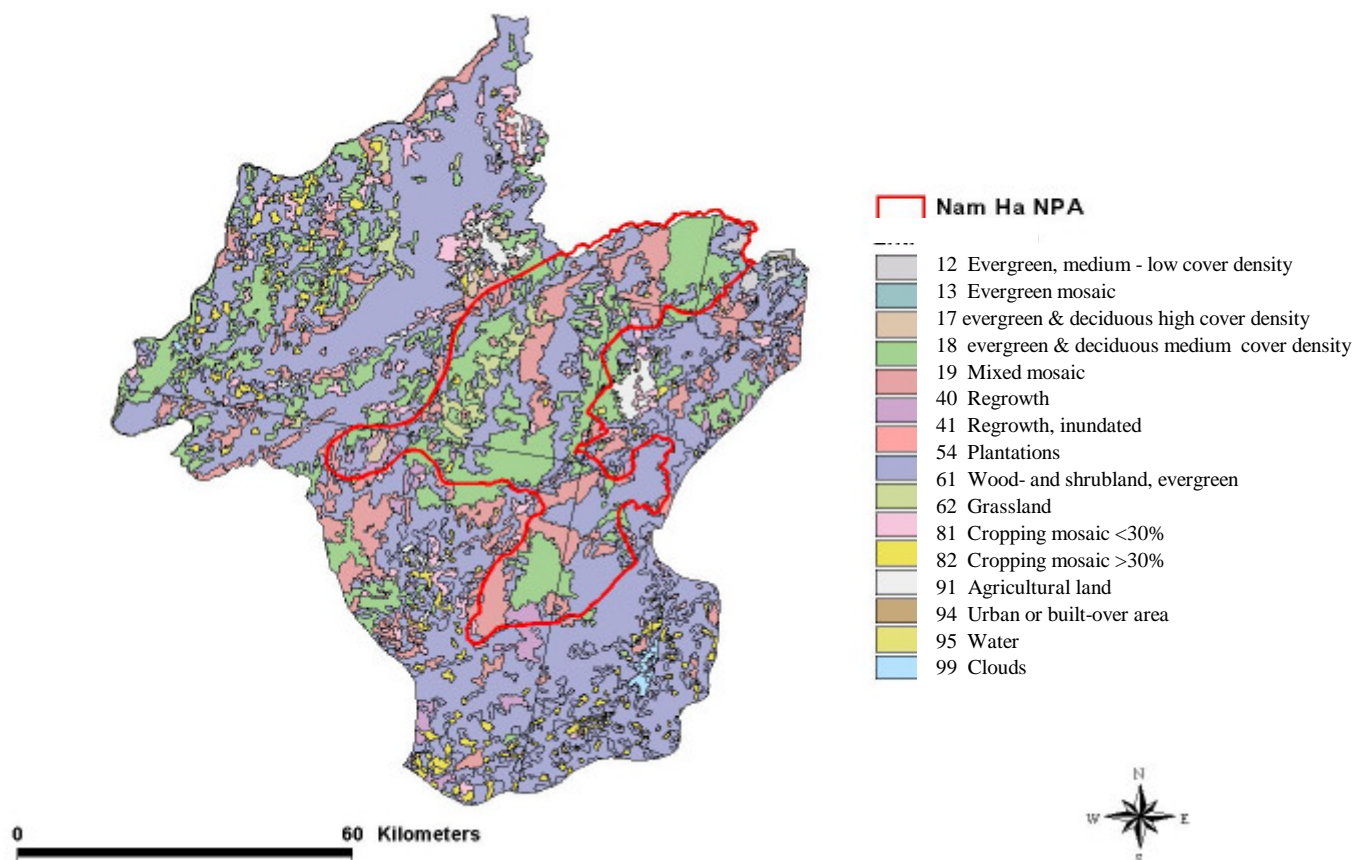
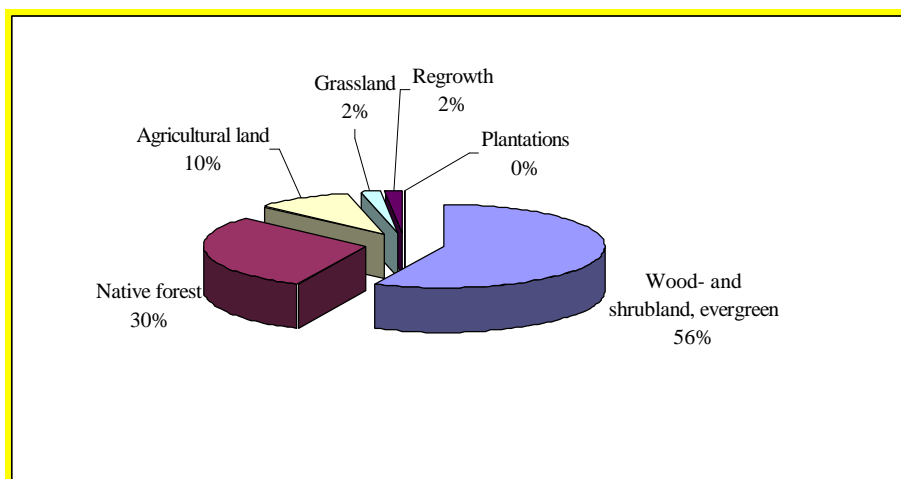


Table 3 Area and percentage of forest and landuse in Luang Namtha Province. source MRC analysis WCS.

MRC code and forest type	Area km2	Percent of Luang Namtha Province
61 Wood- and shrubland, evergreen	5029.259	56.8%
18 Mixed (evergreen and deciduous) medium - low cover density	1493.624	16.9%
19 Mixed mosaic	1024.308	11.6%
81 Cropping mosaic, cropping area <30%	379.7064	4.3%
82 Cropping mosaic, cropping area >30%	304.1735	3.4%
91 Agricultural land	174.1318	2.0%
62 Grassland	160.7805	1.8%
40 Regrowth	146.0008	1.6%
12 Evergreen, medium - low cover density	42.58104	0.5%
99 Clouds	27.92801	0.3%
17 Mixed (evergreen and deciduous), high cover density	26.32173	0.3%
95 Water	21.53064	0.2%
13 Evergreen mosaic	17.85941	0.2%
54 Plantations	11.43397	0.1%
94 Urban or built-over area	1.12651	0.0%

Figure 4 Percent of forest and non forest Source: MRC 1997 data



IV. Economic Activities

A Rural Economy Overview

Lao PDR is one of the world's least developed countries, ranking 140th among 174, and the least developed country in SE Asia. Per capita income in 2002 was US\$310, with social indicators (low life expectancy, high infant and maternal mortality, and low educational levels) among the worst in the region, and closer, on average, to sub-Saharan Africa. Within Lao PDR, the northern region is the poorest. While these statistics are alarming, one does not see starvation and desperation in the local populace to the degree that it may be found in many other parts of the developing world. This is because the people in the area are relatively rich in natural resources. Building materials, food, and herbal medicines are available in the nearby forests. Clean water supplies, brought down from mountain streams, are still available in much of the area (World Bank 2003).

The Government of Lao PDR ranks Luang Namtha Province as the 4th from the bottom of 18 provinces as far as percentage of poor villages (88.6%) and fourth from the bottom in terms of percentage of poor households (70%) (GoL 2003). Nale, Muang Long and Vieng Phoukha are considered poor districts and listed among the 72 priority districts for poverty alleviation. The *Participatory Poverty Assessment* has identified the most important causes of poverty in the northern regions to be: poor land allocation practices, livestock disease, loss of soil fertility, environmental degradation, agricultural pests, and opium addiction (GoL 2001a).

B Agriculture Sector

Rice accounts for more than 80% of the cultivated land area in Lao PDR. Rain fed lowland rice accounts for about 70% of the lowland area and 76% of national production. Rain fed upland rice accounts for about 21% of the nations uplands and 14% of the national production (Schiller *et al.* 2003).

While rural households depend on rice as the main source of carbohydrates (80%), they also rely on livestock, natural and domesticated fisheries and forest resources for their living. Agricultural production in Lao PDR is largely subsistence oriented and farm technology is characterized by low input, low risk and low output. Crops account for about 55% of agricultural Gross Domestic Product, with rice contributing about 40%, livestock 39%, fisheries 1% and forestry 5% .

The Luang Namtha Province has designated 240,050 hectares of land, or about 26% of the total land in the province as agricultural production land, of which the following determinations have been made:

Suitable for paddy:	16,900 ha	7.04 %
Suitable for short-rotation cash crops	26,535 ha	11.05 %
Suitable for rubber or eucalyptus plantations:	196,615 ha	81.91 %

With so much of the land is steep, and with poor soil fertility, that land suited to rice and short-rotation cash crop production is limited. Of the agricultural and potential agricultural land, only 912 hectares within the province as a whole are considered to have high a fertility level, with 5,852 hectares having a “medium” fertility level, and 16,087 hectares considered “fair.” Much of the more fertile land is found in Muang Sing district, from which rice and sugar cane are exported to China. Another 22% of the designated agricultural land is considered “low” fertility. Over 68% is considered to have either “very low” or “extremely low” soil fertility, rendering it unusable for cropland, though perhaps useable for tree plantations. The potential for mixed short-rotation crops and trees, i.e., agro-forestry production, has yet to be fully explored.

Rice is the most important crop, with levels of rice self-sufficiency considered as one of the key criteria for livelihood sustainability. Rice paddy land is in high demand, and is quite limited. Presently the Provincial Agriculture and Forestry Office (PAFO) calculates the amount of land under paddy rice production in the province to be 10,386 hectares. However, provincial and district officials admit to keeping track of only paddy land gained each year, and not paddy lands lost to residential and other uses; so actual land area under paddy could be less than the reported figures.

Upland, swidden rice production supplements lowland paddy rice; with a much lower yield per hectare. Calculations for land presently under swidden production were not available. Eighty-three percent of the population of Luang Namtha Province practices swidden agriculture. Traditional swidden practices involved rotation of cropping over wide areas, leaving fallow lands to recover their fertility for ten to twenty years. Present population levels in many areas make such practices no longer sustainable, and government sedentarization policies are set to discourage swidden agriculture. “Pioneering” swidden, in which areas of primary forest are burned to produce new fields, destroys valuable forestland. It is estimated that an area burned to produce swidden rice valued at US \$500 contains, on the average, \$20,000 worth of timber (ADRA 2000).

In addition to rice, Luang Namtha Province produces cotton, root and leafy vegetables, maize, soybeans, mung beans, peanuts, sugar cane, bananas, and small quantities of other crops. There are tree plantations for rubber, teak, mulberry, and other species. As yet the rubber and teak plantations are not mature enough for production or harvest. Fruit trees are planted mostly for domestic use, with market access a major barrier to commercial production.

Periods of drought or floods tend to occur about once every five years and many of the villagers within the area experience rice deficits for several months of the year. Wildlife pest species such as insects, rats and wild pigs reportedly do great damage to upland crops. The decline in predator species from illegal hunting and incidental poisoning, e.g., birds of prey eating poisoned rats, has greatly reduced natural controls on rodent species that are all native to the region.

1. Land Use Planning and Land Allocation

Land Use Planning and Land Allocation (LUPLA) have been carried out in most of the five districts. One of the main objectives of LUPLA is to limit the amount of land under swidden cultivation. Land has been designated as agricultural land, residential land, village forest for use, village conservation forest, etc. Temporary land certificates have been handed out to some of the villagers. Villagers report being limited to three to four swidden plots per family. Frequently the result has been a shortening of swidden cycles to unsustainable levels, and a subsequent loss of soil fertility. The failure of poorly designed land use planning has been cited as the chief cause of poverty in northern Lao PDR (ADB 2001).

In Luang Namtha the government has delineated village territories, but these delineations have not yet been legalized. The land allocation process is carried out by district staff. First data is collected from villagers to determine present land use and needs, the available labor force, and the experience within individual families. Land allocation is based on these determinations. Then the district issues a temporary land certificate to each family as well as a contract for land use. If the land is not used within any consecutive three year period, the land certificate will be forfeited, and the land given to someone else. In the original land allocation, the government tries to leave some land unallocated so that there will be additional space for growth in the village population.

There are several government and NGO programs to introduce more sustainable, sedentary agricultural techniques and to provide support for their implementation. However, the new techniques take a

long time to become established, and the support systems and available resources often fall short of local needs. ADRA has been doing this in 12 villages in Vieng Phoukha. By incorporating more scientific classification of land use capabilities and more support, coordination and flexibility in working with local villagers from the various ethnic groups more sustainable land use planning could be accomplished.

In a case study specifically dealing with the development of Northern Economic Corridor is the following recommendation.

“Ideally the Environmental Impact Mitigation Plan would also incorporate a plan for complete land use zonation of the entire road catchment area, plans for agricultural intensification, and plans for allocation of lands to existing residents, together with clear zonation of areas which could be taken up by spontaneous relocated persons without impairing the livelihoods of existing residents or increasing the threat to biodiversity or watershed integrity.” (ADB 2000)

2. Opium

Opium addiction and production have earned this region of SE Asia the reputation as the Golden Triangle. International projects working in the area (NCA and GTZ) report that domestic consumption of opium is major cause of poverty among the highland communities especially the Akha. Luang Namtha Province produces 10% of the opium grown in Lao PDR. (UNDP 2002).

3. Crop Development

The Lao PDR-IRRI Research and Training Project involves research support, research development, and training. It is aimed at improving and strengthening rice research capacity within the country. Initial funding was provided by the Swiss Agency for Development and Cooperation beginning in 1990. The upgrading of the skills of Lao scientists and technicians is being done through a combination of in-country training and work experience. Among the in-country courses being offered on a regular basis are the Lao language adaptations of the IRRI courses on Rice Production and Farming Systems Research. The National Agricultural Research Center of Vientiane is where most of the research is based, but a field station is also found in Luang Namtha Municipality.

The MPDLC Program will assist local communities to improve rural production technologies. These interventions will be specifically directed towards poor communities belonging to ethnic minorities. Food security and income will be improved by better production, storage and processing technologies. The Program will assist district authorities in finding ways to implement of Government policies, without negative effects to poor communities or national forest resources. These systems will include elements of watershed management, land use planning, sustainable forest use and community based systems for conserving biodiversity resources, adapted to the local situation. The Program will contribute to the reduction of pressures on fragile upland by promoting productive use of lowlands and will assist local communities to generate more income from improved marketing, processing, small enterprise development and credit schemes. The Program will strive to assist local communities to have better access to existing credit facilities and will introduce sustainable credit management systems with the local institutions involved in administering EC credit funds to apply these systems.

Friends of the Upland Farmer (FUF), promotes non-timber forest products and supports their sustainable harvest and domestication. FUF has domesticated cardamom plantations in Ban Nam O, Ban Plang, Ban Nam Kham, and Ban Dong Vieng. Friends of the Upland Farmer also buys wild palm fruit and assists some villages in growing soy beans and maize. The District Agriculture and Forestry Office (DAFO) reports that there is presently no market for the NTFP resin, *kii sii*, which is also available in the District

4. Animal Husbandry

Livestock is another important aspect of agricultural production, including cattle, buffalo, pigs, chickens, ducks, turkeys, and goats. Besides providing meat, cattle and buffalo are used for plowing, though they are being replaced in many areas by tractors. Livestock also serve for ritual and feasting in traditional celebrations. Animals are almost treated as a form of currency in much of the area, with livestock often traded and kept as insurance against future needs. Livestock diseases are a major problem, though the situation is reported to have improved somewhat over the past five years with the introduction of some vaccines that do not need to be refrigerated. Most villages have a veterinary volunteer who works with the

DAFO to provide veterinary services. Silk worms are also raised for textile production, with NGOs providing technical assistance in production and marketing.

The goal of the EC Strengthening of Livestock Services and Extension Activities project is to enhance smallholders' income from livestock rearing. The specific objectives are: to strengthen veterinary services and the extension network at all levels for delivery of animal health and production services, to reduce livestock disease incidence, improve management practice and increase livestock productivity. Project components include: legislative program, information systems, laboratory services, extension and field services, regional and sub-regional co-operation, information and communication, management, monitoring & evaluation.

C Forestry Sector

Forestry contributes 7-10 percent of Lao GDP and 15-20 percent of non-agricultural GDP. The sector contributes 34 percent of total export value, and even more of net foreign exchange. In rural areas forest exploitation is one of the few available economic activities.

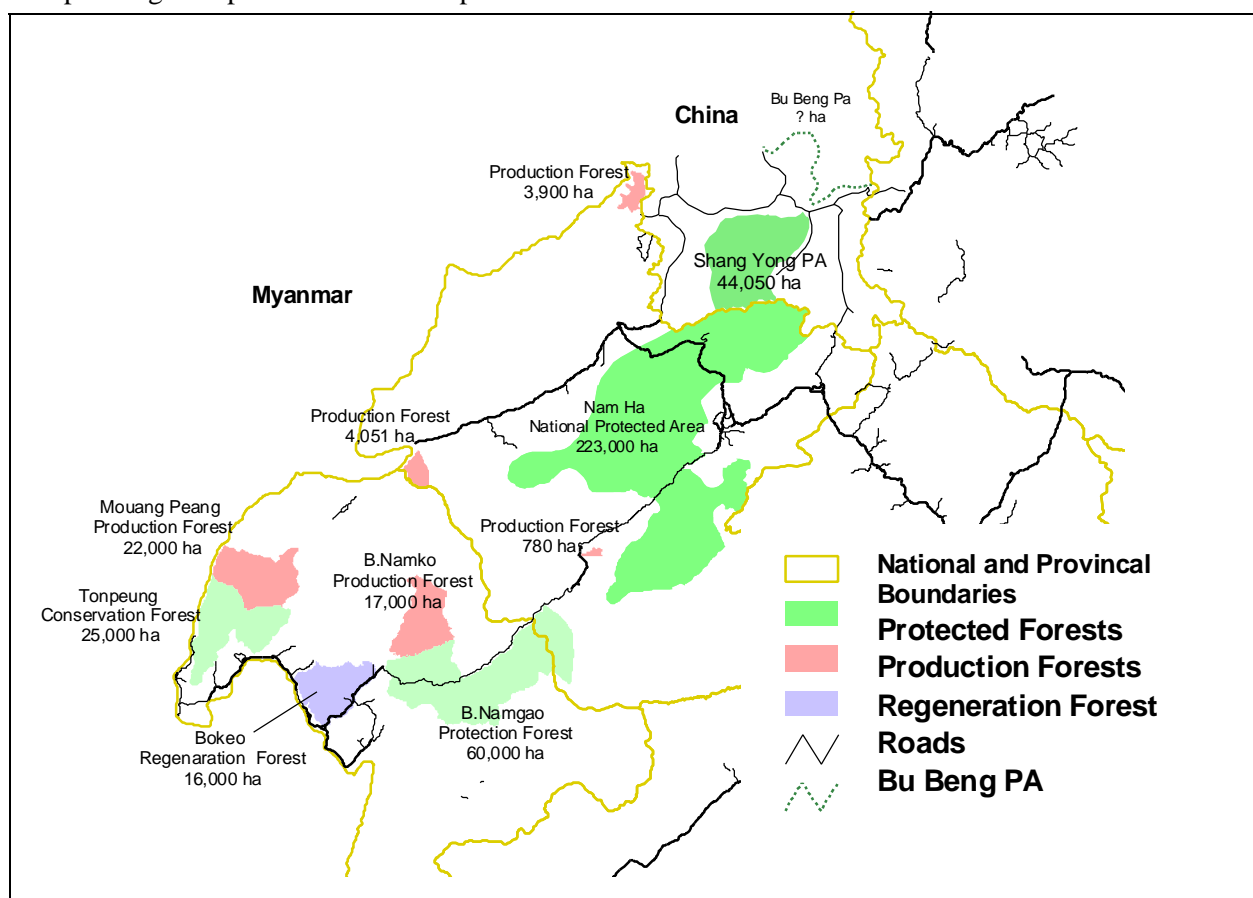
Eighty percent of Lao PDR is forested, but more than half of this is degraded forest. Production forests are designated on 2.5 million hectares, but these are not yet mapped, nor criteria for their designation published, nor is logging confined there. Forests with potential for commercial production may actually total more than 5.6 million hectares. Plantations have been established on 57,000 hectares but less than half are available for production. While log production has grown at an increasing rate since the 1980s, royalties as a share of GOL revenues have decreased. Deforestation of all types is occurring at 0.6-0.8 percent per year (World Bank 2001)

Wood and wood products are the chief exports from Luang Namtha Province. Timber and plywood rank first and second in gross value of goods exported to Yunnan Province from the Lao PDR (Donovan *et al.* 1997). Logging quotas based on forest management plans are set by the province; but the plans are not based on sustainable harvest formula. In fact the quotas are quite flexible, and sometimes change over the course of the year, such that official timber harvest often greatly exceeds the original quota. For example, in the fiscal year 1998 to 1999, Luang Namtha Province planned to harvest 2,300 cubic meters of timber and actually harvested 4,165 cubic meters (World Bank 2001). According to the Department of Forestry, some of these increases may be due to unmet quotas carried over from previous years.

Logging operations are presently going on along the western boundary of Luang Namtha Province in an area that has been designated as production forest (See Map 4). However reports from the Forestry Sector at the Bokeo PAFO complain of incursions from loggers in Luang Namtha extracting timber from across the provincial border well into Bokeo Province and the Nam Kan Provincial Protected Area. The Bokeo PAFO has requested that the National Geographic Office conduct an official provincial boundary survey; but there has not been a follow up to this request yet.

During 2002 several logging operations were also going on within the Nam Ha National NPA. One was an illegal timber harvest contracted by a hydroelectric company, with local villagers conducting the actual tree cutting. The staff of the Nam Ha NPA Management Office stopped this before too much damage had been done. However, all of the trees harvested were close to a waterway, and this will have erosion and sedimentation impact. Provincial officials sanctioned another logging operation for "paddy development" and for an "access road" within the NPA. It was quite clear, however, by the reported amount and size of the logs being harvested (some up to two meters in diameter) that the focus was timber harvest. Additional piles of logs and firewood are often seen along roadsides that are "opportunistic" sales.

Map 4. Regional protected areas and production forests



1. Natural Resource Use (NTFP)

Forests form the economic base for rural communities, providing households with food security, fuel and construction materials (deKoning 2000). Women collect mushrooms, wild berries, fruit, nuts, honey, earthworms, and medicinal herbs. Men hunt wild animals. In periods of drought or floods, which tend to occur about once every five years, hunting and gathering forest products become important mechanisms to cope with food shortages

Non-timber Forest Products which includes wildlife (NTFPs) make up a significant portion of both the subsistence needs and sources of income for villagers. There are different forest products available in different seasons, making NTFP collection a year-round job. Many of the products people rely on for their daily needs and commercial harvest will only grow under continuous forest cover.

Hundreds of forest plants are used for food, roofing thatch, building materials, utensils, containers, rope making, dyes, medicines, fish poisons, etc. Bamboo and rattan are the most important plants for domestic use. Both have shoots that serve as an important food source, and both are used in home building and for making common everyday utensils and containers. Common foods from the forest include wild taro, bamboo shoots, mushrooms, wild tree fruits, wild herbs, and an assortment of vegetables. In addition, rural people depend on hunting small animals such as squirrels, wild pigs, small birds, deer, rats, snakes, and lizards for a significant portion of their protein needs. These wild food sources are especially important where there are rice deficits for several months of the year.

Plants of commercial value include bamboo, rattan, tree fruit, broom grass, tree resins, and medicinal plants (Jin 2001). Some of the most important commercial species are cardamom (*mak naeng*), palm fruit (*mak tao*), and the bark of a vine known as *peuak meuak*. Aromatic eaglewood, locally known as *mai khetsana*, is also sold, although overharvest has led to dwindling supplies and a temporary ban on further

harvest. Wildlife is also widely hunted and sold illegally as a source of income. Buyers include both local consumers and procurers for international markets. A recent study identified “about 150 species of wild plants and animals in China-Lao PDR transboundary trade, among which about 100 species are illegal species . . .”

In a study of wildlife hunting and use by 320 households in 24 villages in the Nam Ha NPA and surrounding communities, wildlife and fish were reported to make up an average of 66% of the meat consumed during the week by five ethnic groups surveyed (Akha, Hmong, Tai, Khamu, Kui) (Johnson et al 2003). On average, wildlife was eaten 1.9 times while fish was eaten 1.95 times per week. Across all households (n=317), there was an expressed preference for domestic meat (42%) followed by wildlife (34%) and then fish (24%). Between the ethnic groups surveyed, the Akha were unique in that more households reported a preference for wildlife over domestic meat, although the difference was not large.

Wildlife most frequently hunted and eaten were small animals <2 kg. in size: rodents (squirrels and rats), small songbirds, frogs, and gallinaceous birds (partridges and pheasants). See Table 4. They are also reported to be relatively more abundant in the NPA while many larger-bodied animals are commonly reported as decreasing in abundance. Guns are the most commonly used weapons for capturing medium-large bodied terrestrial wildlife (species that are more frequently reported to be in decline) and arboreal animals (raptors and hornbills).

Table 4. Most Frequently Used Wildlife. (Source: Johnson *et al.* 2003)

Wildlife most frequently hunted	Frequently hunted with guns	Frequently hunted with snares	Used as medicine	Frequently sold	Frequently eaten
1. Red-cheeked Squirrel	*	*		*	*
2. Pallas's Squirrel	*			*	*
3. Black-crested Bulbul	*	*		*	*
4. Hoary Bamboo Rat				*	*
5. <i>Hoplobatrachus rugulosus</i> (frog)					*
6. Bar-backed Partridge		*		*	*
7. Spangled Drongo	*	*		*	*
8. Great Barbet	*	*		*	*
9. Thick-billed Green Pigeon	*			*	*
10. Silver Pheasant	*	*	*	*	*
11. Rufous-throated Partridge		*		*	*
12. Red Junglefowl	*	*	*	*	*
13. Grey-peacock Pheasant	*	*	*	*	*
14. Lesser Oriental Chevrotain		*		*	
15. Greater Coucal		*			

Wildlife most commonly reported by households as decreasing in abundance were largely those identified as being under some category of risk in Lao (see Appendix C). Reptiles (pythons, king cobra, softshell turtles, monitors) were among the animals most frequently reported as decreasing in abundance. Large cats, primates, pangolin and hornbills were also frequently reported as decreasing. Prey items for large cats are frequently reported as declining (Sambar deer, Southern Serow) or are infrequently reported (Gaur).

D Industrial Sector

1. Tourism

Tourism to Luang Namtha District has expanded considerably in the past ten years. Within Luang Namtha as a whole, the number of tourists recorded as entering the province increased from 4,732 in 1995 to 24,700 in 2000 (Allcock and Lyttlon, 2002). The average length of stay is reported to have increased also, although comparative statistics are not available. The proportion of these tourists staying in Luang Namtha District has also increased, largely in response to cultural, ecological, and adventure tourism development in the area.

The Nam Ha Ecotourism Project, working with the local Tourism Authority, and funded by the New Zealand government and the United Nations Education, Science, and Culture Organization, has had success in attracting tourists and directing them to activities that are environmentally and culturally sensitive. This has generated income to the villages involved, and to the province as a whole through taxes and permits. Most of these tourists are young, independent “backpacker” types, but visits from package tours are on the increase (Schipani and Soulianoh 1998).

As of March 2002 there were twenty-two guesthouses in Luang Namtha municipality (up from about three in 1997). Most of the guesthouses offer simple accommodations. Five of them do not meet Tourism Authority standards for acceptability. Prices range from one to fifteen dollars per night. There are only two guesthouses that offer a standard of accommodation more suited to mid-priced tourism. Seven of the guesthouses have attached restaurants. In addition, there are two restaurants in town that meet Tourism Authority standards. Food is primarily Lao and Chinese. There is one bakery.

There are three nightclubs in Luang Namtha municipality, with music, dancing and bar girls. Unsavory forms of tourism development such as brothels and drug tourism (opium, amphetamines, marijuana) have arisen at the same time as the more positive developments. Nearby Muang Sing, which had grown into a hotbed for drug tourism and culturally insensitive trekking, has recently had its guide service incorporated under the Nam Ha Ecotourism Project, and some of these problems are being dealt with.

Nam Ha Guides Association (NHGA) is a non-profit business that promotes ecotourism to the Nam Ha NPA through the Provincial Tourism Office in Luang Namtha. They offer several day and overnight treks to villages. NHGA works with eight communities (total population 2000). Villagers receive direct benefit from being guides and selling food, lodging and handicrafts. Though the size of these benefits has not been estimated, some villages receive 40% of total village income from tourism. The gross revenue by the NHGA from October 2000 to February 2002 was \$34,400 from over 2000 tourists from 38 countries. Villages are reported to be overwhelmingly enthusiastic with the tourism project, as are the provincial authorities. Revenue to the protected area during this time period was \$3,000, with 40% being returned to tourism through trail maintenance. Biodiversity monitoring data has not been gathered, so it is not known if there is a positive or negative impact on wildlife or NTFP as a result of tourism. An external review states, “present income from tourism probably only marginally reduces villagers’ reliance and desire for wildlife as part of the subsistence strategy” (Allcock and Lyttlon, 2002).

Other tourism ventures in Luang Namtha include WildSide, a private tourism company offering rafting trips on local rivers and an elephant circus being developed by a Chinese import / export business between the towns of Natuei and Boten., in Namtha District. Here eight elephants were brought from Xayabouri Province for entertaining the people in Lao PDR and PRC.

The Nam Ha Ecotourism Project has described the area around Vieng Phoukha as a potential “ecotourism gold mine.” Potential tourism attractions in the area include many sites of cultural and archaeological interest, as well as beautiful forests, caves, and waterfalls. However, the most important attraction of the area is its people who are of diverse ethnic groups and traditions.

A major constraint to developing cultural and ecological tourism in Vieng Phoukha District is a lack of infrastructure. There are three guesthouses with very basic accommodations and only one restaurant with a limited menu.

V. Protected Areas

A The Nam Ha National Protected Area

The Nam Ha National Biodiversity Conservation Area was gazetted in 1993 in the establishment of the original Lao PDR protected area system. It is located entirely in Luang Namtha Province and originally covered an area of 690 km². Nam Ha is the name of the largest river that passes through the NBCA. In 1995 the area west of the Nam Ha River (956 km²) was proposed as the Nam Ha West NBCA (Berkmüller *et al.* 1995). In 1995 the provincial forestry authorities in Luang Namtha Province designated the 348 km² Nam Kong area as a provincial protected area. The Nam Kong area is along the Lao/China border and adjacent to

the Shangyong Nature Reserve in Yunnan. In November 1995 a 236-km² corridor was added by provincial forestry authorities connecting Nam Kong to the proposed Nam Ha west NBCA. It was recommended that Nam Ha (west) and the Nam Kong provincial protected area be added to the existing Nam Ha NBCA to form a single administrative unit. This amalgamation occurred in 1999. It is important to note that many maps made by other sectors of the government and industries do not show this addition. In 2001 the English translation for NBCA was officially changed to national protected area. The total area is now known as the Nam Ha National Protected Area (NH NPA) (see Map 4).

The Nam Ha NPA is part of a regional system of protected areas. The Nam Kan Provincial Protected Area in Bokeo Province borders it on the south. The Bokeo Agriculture and Forestry Office has requested that the 77,500-hectare Nam Kan PPA be considered as a National Protected Area; but this area has not been selected to date. It is not clear what protective role the province presently plays in the Nam Kan Provincial Protected Area. To the north of the Nam Ha NPA is the Shiang Yong protected area in Yunnan Province of China. Together these three protected areas constitute an important transboundary wildlife corridor, especially for wild Asian Elephants and other endangered wildlife species that require large territories to maintain viable populations.

The Nam Ha NPA now covers an area of 2,230 km² or 24% of Luang Namtha Province. It ranges in elevation from the level lowlands of the Luang Namtha Plain to peaks of its northern highlands (560 m. - 2,094 m.). The majority of the Nam Ha NPA, 64%, lies between 800 and 1200 m., with only 9% below 800m and 27 % above 1200 m. (see Map 2). Portions of all five districts in Luang Namtha Province are included within the boundaries of the Nam Ha National Protected Area. The Nam Ha NPA is divided into four zones for management (see Table 5). Core zones have been designated as per MAF regulation 0525 and covering 683.5 km² or 30.6% of the protected area.

Table 5. Nam Ha NPA Core Zones. (Source: Tizard *et al* 1997)

ZONE	ALTITUDE	DOMINANT VEGETATION TYPES	OTHER
Luang Namtha Plain 221.3 km ²	540-1000 m.	?? Evergreen forest ?? Secondary evergreen forest ?? Secondary moist riparian evergreen ?? Abandoned settlements with disused orchard trees ?? Mosaic of human-modified habitats including ?? bamboo stands, secondary evergreen forest types ?? various stages of secondary scrub and regrowth	Crossed by two wide rivers and many smaller streams
Northern Highlands 444.7 km ²	1000-2094 m.	?? Mature old-growth moist evergreen forest ?? Secondary dry hill evergreen forest ?? Submontane evergreen forest ?? Montane evergreen forest ?? Extensive tracts of tall bamboo ?? Large fields of <i>Imperata</i> grass	Patchy but extensive areas cleared for swidden agriculture Several peaks > 2,000 m.
Southern Highlands 43.5 km ²	1000-1572 m.	?? Large tracts of dry evergreen forest ?? Mosaic of cultivation, and regenerating scrub and secondary forest	Two peaks >1500 m.
Nam Kong 155.5 km ²	600-1556 m.	?? Secondary evergreen forest ?? Mosaic of cultivation, and regenerating scrub and secondary forest.	Few peaks over 1000 m.

1. Infrastructure

The headquarters for the Nam Ha National Protected Area Management Unit is in Luang Namtha municipality. The Wildlife Conservation Society (WCS) provides office space for the Management Unit.

Equipment: one Toyota Hilux truck, four motorcycles, one generator to provide electricity for the office during the day, four laptop computers, a printer, a fax machine, a library, maps, a camera, a GPS, binoculars, and camping equipment.

Wildlife Conservation Society began financial support and technical assistance to the Nam Ha NPA in 1995 and continues to the present time. Activities include capacity building of protected area staff, community awareness activities, implementation of protected area management activities, such as patrolling and wildlife monitoring, village natural resource use rule development, land allocation, gun handover and conservation linked community assistance projects including cardamom, appropriate transportation alternatives, field station and school construction, small-scale irrigation, and ecotourism.

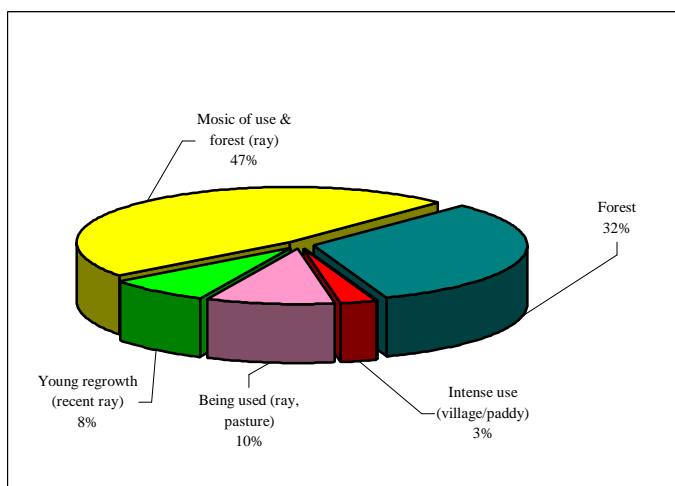
2. Staffing

Staff of the Nam Ha NPA consists of three full-time NPA staff, five part-time DAFO forestry staff, one from each district, and two Lao project support staff, provided by WCS. In the past there have been one full-time expatriate advisor from WCS and two DED technical advisors. The unit currently receives technical support from the WCS office in Vientiane. A training needs assessment was completed in 1999 (Hansel and Vannalath 1999) and capacity building has included a wide range of basic skills in protected area design, management, monitoring and evaluation. Basic job skills training has included English language, computers, and motor vehicle driving.

3. Nam Ha NPA Landuse

The percentage of various kinds of land use in the Nam Ha NPA as estimated by the Land Satellite Photo System (LANDSAT) imager is shown in Map 3, and Figure 5. It is estimated that 32 % of the protected area is unbroken forest, with 47% of the protected area under a landuse that results in a mosaic appearance. This is a combination of small patches of forest with *hai* fields. About 8% is young re-growth with the remaining 13% under intense or moderately intense landuse.

Figure 5. Percentage of different landuse intensities in the Nam Ha NPA (Source: Hedemark and Vongsak 2003).

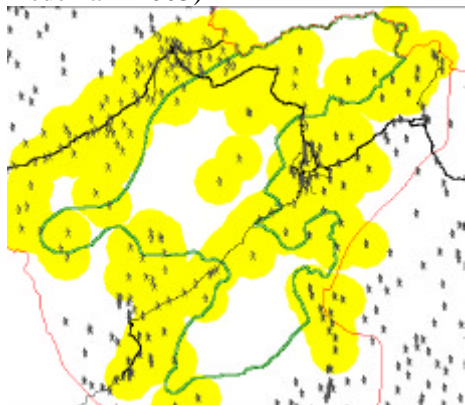


While intense agriculture is obvious from satellite images, the various forest types are not. Ground-truthing indicates that some of the FIPD interpretation of forest types may not be accurate, and that their determination of 75% Upper Mixed Deciduous forest is probably an overestimate. Ground-truthing indicates an underestimate of Bamboo and Un-stocked Forest and Evergreen Gallery forest. This is confirmed with the landuse intensity interpretation that shows human use in 68% of the protected area that would favor Bamboo/Un-stocked forest classifications. The 68% human-use determination also relates well with the predictive model of buffered roads and villages to 5 km. (62%).

4. Nam Ha NPA villages

The Nam Ha NPA is easily accessible with many improved roads that have heavy use by communities within and near the protected area. One hundred and four villages are found within 5 km. (a days walk) of the NPA boundary.

Map 5. Villages and roads of the Nam Ha NPA buffered to 5 km. (Source: Hedemark 2003)



Map 5 illustrates the area of human use in the protected area as predicted by buffering villages and roads to 5 km. 62.3% of the protected area is within 5 km. of a village or road and 37.7% is outside 5 km. (Hedemark 2003). Villagers living in or near the area conduct an estimated 90% of the shifting cultivation activity in the NPA (Johnson 1999). People from outside of the immediate area do the remaining 10%. NTFPs, harvested from the NPA are primarily cardamom, rattan, bamboo, jewel orchid, eaglewood, and ginger. They are used for food or sold. It is estimated that NPA residents conduct 70% of the sale of NTFPs and people outside the NPA 30%. Of the NTFPs harvested for food, it is estimated that villagers in the NPA use 80% and people outside the area 20%. A wide range of wildlife is harvested for food and sale. It is estimated that NPA residents conduct 40% of the collection of wildlife for sale from the NPA and people outside the area 60%. It is thought that 70% of the collection of wildlife for food is done by residents and 30% by outsiders. People both in and outside of the area, 50:50, harvest some timber from the NPA for use. NPA residents, 40%, and people outside the area, 60%, use lands inside the NPA for grazing of livestock (see Root Cause Analysis in Section VIII). Because livestock range freely, there have been cases of tigers preying on domestic buffalo. New sugar cane fields planted around Muang Sing and habitat loss within the NPA have resulted in increased elephant/human conflicts in Long District.

5. Management plans

The goal of the Nam Ha Management Plan is to conserve the unique biodiversity of the Nam Ha NPA and to promote sustainable livelihoods of the inhabitants. Nam Ha NPA is developing a second management plan for 7 years from 2003 to 2010. The first 5 year Management Plan ran from 1998 to 2003 (WCS 1996, Meredith 1997, Johnson 1999). Both plans were based on root cause analysis (see Section VIII)

The current management objectives being followed by the Unit to reduce indirect and direct threats to biodiversity in the NBCA are (Johnson 1999):

- ?? To increase the capacity of the management unit to do conservation extension, monitoring, patrolling and enforcement and natural resource management
- ?? To increase knowledge and awareness in the province, districts and villages on direct threats to biodiversity
- ?? To reduce threats to an acceptable level by implementing rules for sustainable use of aquatic and terrestrial wildlife, plant-NTFPs and timber (boundary demarcation, patrolling, land use planning)
- ?? To increase communication and cooperation among government and non-government agencies to sustainably manage natural resources.
- ?? To increase cash income, through sustainable use of NPA biodiversity (NTFP trials, cultivation, & sustainable harvest, nature-based tourism)

B Provincial and District Protected Areas

There are no Provincial Protected Areas in Luang Namtha Province. There are two small District Protected Areas. One is located just east of Muang Sing and the other just northeast of Nale. Vieng Phoukha District has two protected forests. The Poumot Protected Forest to the south and east of the roadway near the town of Vieng Phoukha contains within it part of the earthen walls and ruins of an ancient city. The district's other protected forest, called Pou Peng, to the south of Route 3 between Ban Nam Sing and Ban Nam O, has been described by the Luang Namtha Provincial Department of Information and Culture as an area of great natural beauty and healthy forest, worthy of preservation. Within the Pou Peng Protected Forest are several caves and they are now the focus of a EC ecotourism project.

VI. Conservation value

A Fauna Overview

1. Previous Fauna Studies

There appears to have been no investigations by biologists to the Luang Namtha region during the French colonial period in early to mid nineteenth century (Tizard *et al.* 1997). The provinces of Xieng Khouang and Phongsali were visited during this time and provided most of the early biological data known about northern Lao. The Nam Ha area was first visited in February 1991 by the World Conservation Union (IUCN) and the Department of Forestry who conducted interviews in several villages in the area as part of an assessment of the conservation value of the area (Berkmüller *et al.* 1995). In 1996 LNT PAFO and WCS conducted village interviews in 22 villages in and around Nam Ha in conjunction with the WCS Community-based Conservation Project (Ling 1998). In 1997 WCS and CPAWM conducted the first wildlife survey of the Nam Ha National Protected Area (Tizard *et al.* 1997). In 2001, monitoring patrols were begun as part of WCS Cooperative Project activities (Johnson and Phirasack 2002). In 2002 ADB completed an Environmental Impact Assessment (ADB 2002) along the entire length of the Route 3 for road upgrade project. As a part of that project, WCS completed a baseline survey of wildlife and human use along the section that passes through the protected area (Marris *et al.* 2002). Also in 2002 WCS Cooperative Project conducted a second wildlife survey as part of the forest inventory work (Hedemark and Vongsack 2003).

2. Wildlife and other Terrestrial resources

Thirty-seven large mammal species have been found in the Luang Namtha Province with at least 19 mammals considered Key Species of conservation concern (Tizard *et al.* 1997, Hedemark and Vongsack 2003). Key species² accounts are included in Appendix A. These include elephants, tigers and other wild cat species, wild cattle, gibbon, monkeys, and bears. In addition, 297 bird species have been recorded in the Luang Namtha area, including 19 species of special conservation significance. Threatened and endangered bird species include hornbills, pheasants, partridges, woodpeckers, kingfishers, warblers, and parrotbills. There is limited data available on reptiles as no formal surveys have been done; however Rock Python, *Python molurus*, is known to inhabit the area, and Asian Yellow Pond Turtle *Mauremy mutica*, and the Siamese Crocodile are possibly present (Salter 1993; Stuart pers. comm.).

3. Aquatic resources

Aquatic resources in the protected area are highly diverse and an important source of local subsistence and domestic trade. More than sixty fish species have been identified in the Namtha River. Carp and catfish species are the most abundant groups.

B Flora Overview

1. Previous Floristic Studies

As reported by Tizard *et al.* (1997), there appears to have been no investigations by biologists to the Luang Namtha region during the French colonial period. The provinces of Xieng Khouang and Phongsali were however visited during this time and provided most of the biological data known about early northern Laos. Vidal from 1956-60 produced the most authoritative descriptions of Lao forest habitats available (in Rundel 1999). Also Xu did a detailed study in Odomxay Province in 1994 as part of a feasibility study for a botanical garden (1994). In 1996 Newman and Traymany did a survey of non-timber forest products and made a basic forest classifications of Luang Namtha Province (Newman and Traymany 1996). Hedemark and Vongsack in 2002 compiled habitat descriptions for close to 100 sites in the Nam Ha NPA and with the

² Keys species of mammals are all species included in the IUCN Red List of Threatened Animals (IUCN 1996) and species listed by Duckworth (1999) to be of "Special Conservation Significance" in Lao - i.e. species that are not considered to be threatened on a global scale, but are regionally rare, or occupy a restricted range.

Key species of birds are all species listed in the IUCN Red List of Threatened Animals IUCN (1996), which follows Birds to Watch 2, the world List of Threatened Birds (Collar *et al.* 1994) and species listed by Treesucon and Round (1990) as being At Risk in Thailand.

FIPD evaluated forests and landuse for the protected area. To date much of what is known about Luang Namtha forests is drawn from work done in northern Thailand and from Yunnan Province in China.

2. Agricultural Resources

Lao PDR is said to lie in the center for the origin of cultivated rice. Between 1995 and 2000 most rice growing areas in Lao PDR were surveyed by the National Agricultural Research Center (NARC) and the International Rice Research Institute (IRRI). 13,193 samples were collected and found to represent 3,160 distinct variety names (Rao *et al.* 2001). 237 samples of wild and weedy rice were also collected representing seven known wild species in the genus *Oryza*. This is one of the most comprehensive collections of cultivated rice in any single country. The Lao germplasm collection is held at NARC in Vientiane and at the International Rice Genebank at IRRI in the Philippines. All samples have been classified to ecosystem, endosperm type and maturity time.

Farmers in Luang Namtha Province provided 406 varieties names of rice for the survey mentioned above (Rao *et al.* 2002). This is the third highest diversity after Luang Prabang and Sayabouly provinces. Forty-nine percent of the names given were unique to Luang Namtha province. This rice diversity is the result of generations of selection based on cultural, environmental and climatic conditions. Many ethnic farmers continue to grown these varieties as a result of culture preference.

3. Forest Resources

Current figures on actual forest cover in Luang Namtha provinces are not available at the time of the preparation of this document. However, the Department of Forestry's National Forest Inventory Project is in the process of analyzing land use data and forest types from year 2000 satellite imagery for the entire Lao PDR. Satellite imagery from 1990 shows 57% forest cover in Luang Namtha Province. Table 6 shows the amount of different forest types.

Table 6. 1990 Forest Land Types (550,400 hectares): (Source: PAFO, as provided by the Luang Namtha STEA)

Forest classification	1990	Percentage
National Protected Area Forest:	71,910 ha	13.07 %
Provincial Protected Area Forest:	40,243 ha	7.31 %
District Conservation Forest:	27,872 ha	5.06 %
Mixed Forest:	146,204 ha	26.56 %
Scrub or fallow:	264,170 ha	48 %

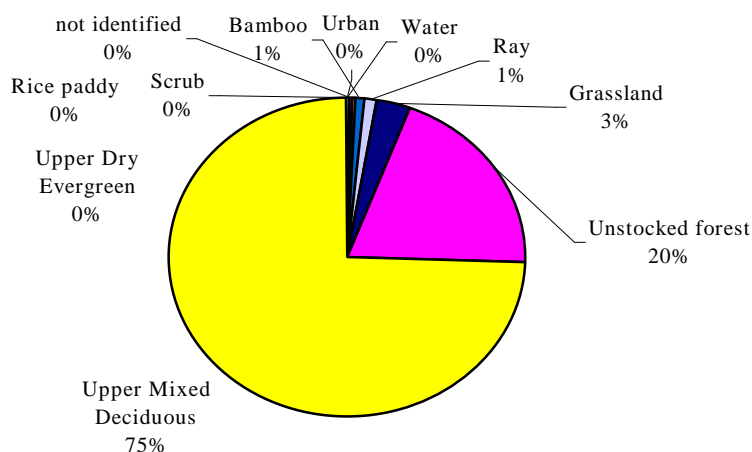
Note the provincial protected area forests were combined with the Nam Ha NPA in 1999. Also note that nearly half of the land designated as "forest" is in fact scrub or fallow – essentially *potential* forest, at least some of which is still under swidden cultivation. In addition, the "mixed forest" category, which is made up of various mixed deciduous and evergreen forest types, also includes "bamboo forest" and "unstocked forest" neither of which can technically be called forest. (Bamboo is a grass, not a tree; and unstocked forest contains less than 20% tree cover.) The percentage of these latter two types was not provided in the data given. Therefore it is not possible to derive from official data the actual forest cover. Also village-level conservation forest has not yet been mapped.

4. Nam Ha NPA Forest Cover

In 2002 the FIPD and WCS completed a forest inventory for the Nam Ha NPA (Hedemark 2003). Ten landcover types were identified by the FIPD from Spot satellite imagery (see Map 3). The area of each is depicted in Figure 6. FIPD determined the Nam Ha NPA to be 75% Upper Mixed Deciduous forest and 20%

Unstocked forest with 3% Grassland and the remaining 2% to be Dry Evergreen Forest, Rice Paddy, Hai, Bamboo and Towns.

Figure 6. Percentage of forest types in the Nam Ha NPA. (Source: Hedemark 2003)



Within the mixed deciduous landcover category FIPD determined that 85% has 40-70 % canopy closure, 11% has 70-100% closure and only 4% has 20-40% closure. They also determined a stand structure size of 68% small saw timber 40-70% dbh, 32% pole timber 20-40 cm. dbh and less than 1% large saw timber >70 cm. dbh.

VII. Indigenous Knowledge

The people of Luang Namtha Province have a rich cultural diversity and rich traditional knowledge of biodiversity. Some of these stories have been recorded by anthropologists with specific ethnic groups (see Table 7). The extent and diversity of ethnic relations to the environment are too numerous to discuss in this profile, however common among these studies, are stories of peoples relation to and understanding of the origin of forest resource and their use and management for food, and medicines. These are manifest in village and family totems, and ancestor worship. Harmony with nature is often mentioned, however some stories tell of an adversarial relationship with elements in nature and mans fight for survival.

Indigenous knowledge with relation to species distribution and abundance has been collected by the Nam Ha NPA staff using Participatory Biodiversity Assessment methods (Vannalath and Hansel pers. comm.). Some of this knowledge is reported in this report in the Key Species accounts in Appendix A

There is concern that traditional knowledge will be lost as old ways give way to more modern and as the natural resources become more scares. Currently rural villagers rely on a large variety of traditional medicines for curing common illnesses such vas stomach problems, cold, fevers, light wounds, etc. Buying of western medicines is ranked high as a source of expenditure in most villages. In some ways local medicines may be a better and cheaper alternative in some cases. (Foppes & Kethpanh 1997)

Table 7. Partial list of authorities on ethnic groups for Luang Namtha Province

Ethnic group	Local Authority
Akha	Dr. Leo A. von Gesau, and Noriko Higashide, SEAMP-CD-RDI, 137/3 Natharam, Chiang Mai 50100, Thailand.
	Michael Epprecht, GTZ Muang Sing project
	Brian Wood photographer working with Akha people

Khamu	Suksavang Simana and Elisabeth Preisig Kmhmu Cultural Research Project, Vientiane P.O. Box 6444,
	Damrong Tayanin and Lindell, Kristina, Scandinavian Institute of Asian Studies. :Lund Swedin http://www.ling.lu.se/research/profileareas/KammuResearch/pub_culture.html
Hmong	Yang Yai ADRA Luang Namtha
Lamet	Karl Gustav Izikowitz

More general reference to indigenous knowledge include:

- ?? Laurent Chazee 1999. *The Peoples of Laos: Rural and Ethnic Diversities* White Lotus Press.
- ?? Anderson, Edward F, 1993. *Plants and people of the Golden Triangle*, Silkworm Books
- ?? Goodman, Jim, 1997. *The Akha Guardians of the Forest (People and cultures of Southeast Asia)*, Teak House Publication
- ?? Kittisak Ruttanakrajangsri *Applying Hill Tribes' Traditional Knowledge in Natural Resource Management in Northern Thailand Inter Mountain Peoples Education and Culture*. Impact Thailand

VIII. Root Cause Analysis

PAFO and DAFO staff and villagers agree that biodiversity on the whole is decreasing in Luang Namtha Province and the Nam Ha NPA (Tizard 1997, Johnson 1999, Hedemark and Vongsack 2003). Appendix B lists species perceived to be in decline (Johnson *et al.* 2003). Two root cause analyses (RCA) have been done to determine the reason for this observation. The first RCA was in 1998 when the first five-year Nam Ha NPA management plan was developed (Johnson 1999). The second was completed in 2003 in preparation for the second Nam Ha NPA management plan (GoL (in prep) Management Plan for the Nam Ha NPA). In 2003, participants in the RCA were, DOF, PAFO and DAFO forestry officers, Nam Ha NPA staff, representatives for the Provincial Central Planning Committee and WCS. Participants were selected on the basis of their existing understanding of what biodiversity is³, and by having experience in the management of it. Village perceptions of biodiversity were incorporated into the RCA through a village hunting study that was conducted from 1999-2002. In this study 320 households (24 villages) were surveyed on wildlife use and perceptions of wildlife availability. Household perceptions of the status (increasing, stable, or decreasing) of 56 species of mammals, birds, and herpetofauna were obtained (Johnson *et al.* 2003).

A. Methods

The methods used to determine the root cause are those described in detail in Margolius and Salafsky (1998). The process involves two steps, first, describing the causal chains and second, quantifying the impact of these causes. The causal chains were described by answering the following questions through a participatory process of small group and plenary discussions:

- ?? What components of biodiversity are we concerned about in the Nam Ha NPA?
- ?? What are the direct threats that are believed to be reducing the biodiversity of concern?
- ?? What are the indirect threats that may be at the root cause of the direct threats?
- ?? What activities are being conducted by the NPA Unit to reduce the direct and indirect threats?

These elements were then mapped out in a conceptual model (see Figure 7). Threats were prioritized by means of a threats assessment (Salafsky and Margolius 1999). For the Goal section of the conceptual model, forestry officers reported their perceptions as: increasing-3, stable-2, or decreasing-1, or none present-0 for each district. Numbers from each district were summed and averaged to present the status for the NPA.

³ Biodiversity is defined as having four components: landscape, ecosystem, species, and genetic.

For the Direct Threats section of the conceptual model, officers were asked to report on their perception of two things: 1) What percent of shifting cultivation of the NPA in their district is caused by residents inside the NPA, and what percent is caused by people outside the NPA And, 2) To what extent is shifting cultivation a threat in their district (ranked as: no problem-0, problem decreasing-1, problem same-2, or problem increasing-3)? Numbers from each district were summed and averaged to present the status for the NPA.

For the Indirect Threats section of the conceptual model, officers ranked their perceptions as: low -0 to high -3). Results were then averaged across all districts.

Other data from organized field surveys were presented at the workshops and discussed.

B. Results

The resulting conceptual model is simplified in Figure 7. The threats analysis is summarized in Table 8 (Johnson 1999).

During the workshop participants revisited the goal of the Nam Ha Management Plan; that is to conserve the unique biodiversity of the Nam Ha NPA and to promote sustainable livelihoods of the inhabitants. The conceptual model remains largely unchanged from the 1998 to the 2003 workshop, with the exception that the target species in the goal were reduced to list just the most threatened species and the addition of a fisheries threat component. In general PAFO and DAFO forestry staff and villagers agree that biodiversity is decreasing in Luang Namtha Province and the Nam Ha NPA. Using the methods described above the following perceptions were given for the four habitat groups.

Box 1 (Goal): Habitat (old forest, secondary forest, high fields, plantations)

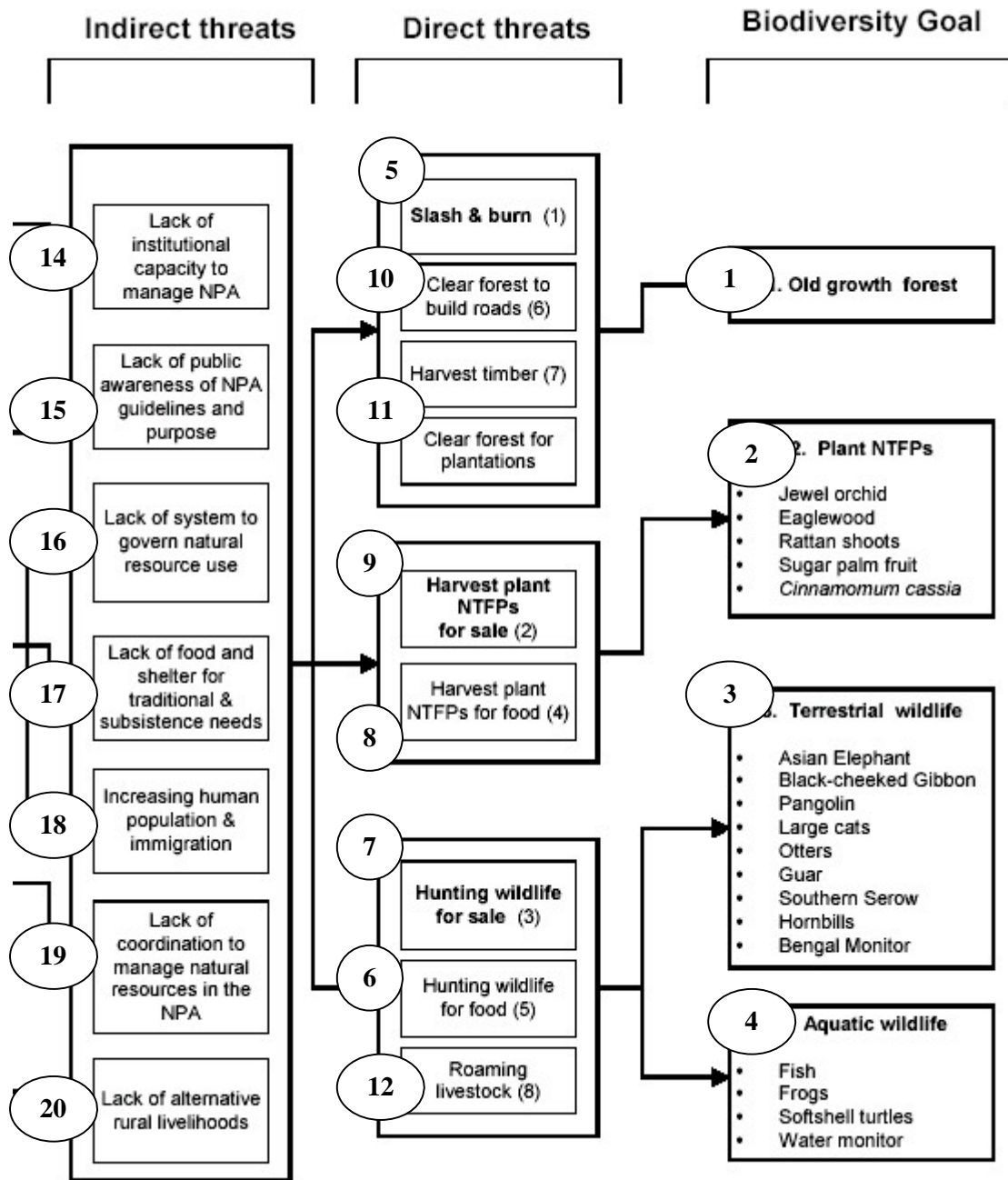
Participants felt old forest was decreasing (1) throughout the NPA, high fields stable (2) on average with increases noted in Sing and Vieng Phoukha Districts, plantations were increasing (3) in Namtha district.

The Forest Inventory of the Nam Ha NPA shows only 33% old forest cover and 67% other habitats (secondary, hai, or plantation) (Hedemark 2003).

Box 2 (Goal): Terrestrial wildlife (28 types of mammals, birds, and herps)

Workshop participants reported their perceptions for all species in their district. They indicated 11 species in decline (elephant, soft-shell turtle, otters, hornbills, gibbon, Gaur, monitor lizards, pangolin, large cats, serow, and silver pheasant) with averages ranging from 0.6 - 1.4). Most other key species were seen as relatively stable averaging from 1.6 - 2.4. Five species (muntjacs, nok kum, wild pigs, squirrels, and macaques) were identified as increasing in number with averages from 2.6 - 3.0:

Figure 7. Conceptual Model: Direct Threats; Indirect Threats; Biodiversity Goal. (Source GoL (in prep))



The hunting study (Johnson et al 2003) showed that 56-100% of households responding felt that 7 of the 11 species identified by district officers as in decline were declining. Village interviews gave no response for three relatively rare species (elephant, Gaur, and gibbon). The only exception in responses was that only 20% of HH felt silver pheasants were in decline. Most (>66%) of households responding also felt that pythons, bears, all cats, and macaques were in decline.

Results from district monitoring patrols show that 13 species occur at frequencies of less than 0.10/kms patrolled (Vongsa and Johnson 2003). These included 8 of the 11 species identified by workshop participants as in decline (see previous paragraph). The additional species were pond herons, pythons, grey peacock pheasant, and bears. Silver pheasants were detected relatively often at 0.34 signs/km.

Box 3 (Goal): Aquatic wildlife (fish and frogs) *Box added to model for this workshop.*

Two districts (Nale and Long) felt that fish populations were stable while the other three districts felt they were declining. Across the NPA, frog populations were felt to be stable. This was consistent with hunting study results where only 17% of households responding felt that frogs were declining.

Box 4 (Goal): NTFPs (10 key types of NTFPs)

Aquilaria and jewel orchid were rated as declining by all. On average, puak muak (tree bark) and two other types of NTFPs were felt to be declining (ranking 1.2-1.4)

Box 5 (Direct Threat): Shifting cultivation

Officers responded that 82% of shifting cultivation in NPA is caused by residents inside the NPA and that the problem is staying the same or increasing in all districts (average ranking of 2.4), except for Long District.

Box 6 (Direct Threat): Wildlife hunting for subsistence

Officers responded that only 58% of hunting-for-subsistence is done by residents inside the NPA. On average, they thought the problem was increasing across the NPA (overall ranking of 2.6).

From the hunting study (Johnson et al 2003), the ten most commonly hunted species are small rodents, game birds, songbirds, and frogs that are <2kg in size. Most of these same species are the most commonly traded and those that are also seen by villagers to be on the increase.

Box 7 (Direct Threat): Wildlife hunting for trade

Officers responded that 62% of hunting-for-trade is done by residents inside the NPA. On average, they thought the problem was the same as in previous years (ranking of 1.8), although Nale District said it was an increasing problem.

From the hunting study (Johnson et al 2003), the wildlife that is most commonly traded is the same as that most commonly hunted (small species <2kg in size). Larger, more rare wildlife is more commonly used and sold for medicine.

Box 8 (Direct Threat): NTFP harvest for subsistence

Officers responded that 74% of NTFP harvest-for-subsistence is done by residents inside the NPA. On average, they thought the problem was the same as in previous years (ranking of 2.0). Namtha and Vieng Phoukha Districts saw it as an increasing problem.

Box 9 (Direct Threat): NTFP harvest for trade

Officers responded that only 52% of NTFP harvest-for-trade is done by residents inside the NPA. On average, they thought the problem was the same as in previous years (ranking of 2.2). Namtha District identified it as an increasing problem.

Box 10 (Direct Threat): Roads

Officers responded that outsiders build 93% of the roads. On average, they thought the problem was the same as in previous years (ranking of 1.8). Three districts identified it as an increasing problem (Long, Namtha, and Vieng Phoukha).

Box 11 (Direct Threat): Logging and plantations

Officers responded that 78% of woodcutting is done by residents inside the NPA. On average, they thought the problem was the same as in previous years (ranking of 2.2). Long District reported it as an increasing problem and done largely by outsiders (70%).

Box 12 (Direct Threat): Livestock grazing

Officers responded that 95% of grazing is done by residents' livestock inside the NPA. On average, they thought the problem was the same as in previous years (ranking of 1.8). Only Namtha District reported an increase in this problem.

Box 13 (Direct Threat): Other threats?

Three districts (Sing, Long and Vieng Phoukha) felt that fire is another direct threat in their district. Only Sing District thought it was an increasing problem. Namtha District thought that plantations (rubber, etc) are a serious direct threat, but ranked the problem as stable.

Indirect Threats

Box 14 (Indirect Threat): Lack of institutional capacity

Average ranking of 1.17 indicated some capacity and the perception that further training is required.

Box 15 (Indirect Threat): Lack of public awareness

Average ranking of 1.00 indicated some awareness and the perception that considerably more conservation awareness is needed.

Box 16 (Indirect Threat): Lack of system to govern natural resource use

Average ranking of 1.5 indicated some governance and the perception that more is needed.

Box 17 (Indirect Threat): Lack of food and shelter for traditional and subsistence needs

Average ranking of 1.17 indicated population still largely dependent on natural resources for food and shelter.

Box 18 (Indirect Threat): Increasing human population / immigration

Average ranking of 1.17 indicated that population is perceived to be increasing.

Box 19 (Indirect Threat): Lack of coordination to manage resources in NPA

Average ranking of 1.67 indicated that officers felt that there is a moderate amount of coordination.

Box 20 (Indirect Threat): Lack of alternative livelihoods

Average ranking of 1.33 indicated that officers felt that there were still few alternatives for people.

Table 8. Summary of Direct Threats Assessment (Source: Johnson 1999)

Slash and burn agriculture.	90% conducted by residents and 10% by outsiders.
Harvest of NTFPs for sale.	70% conducted by residents and 30% by outsiders.
Hunting of wildlife for sale.	40% conducted by residents and 60% by outsiders.
Harvest of NTFPs for food.	80% conducted by residents and 20% by outsiders.
Hunting of wildlife for food.	70% conducted by residents and 30% by outsiders.
Road building that is reducing habitat and improving access for hunting and harvesting by outsiders.	100% conducted by outsiders.
Harvest of timber resources.	50% conducted by residents and 50% by outsiders.
Free ranging domestic animals, which disturb wildlife populations, compete for habitat, spread disease, and increase probability of depredation of livestock by wildlife.	40% conducted by insiders and 60% by outsiders.

IX. Evaluation- Opportunities and Constraints

A Biological Evaluation

1. Regional

The World Wildlife Fund states that Ecoregion 74, the Northern Indo-china Subtropical Forests region, is globally outstanding for its biological diversity, with the highest species richness for birds among all the ecoregions in the indo-pacific and third ranking for mammal richness (Wikramanayake *et al.* 2002). This is because the ecoregion sits astride a major zoogeographic ecotone where the northern Palearctic and the southern indo-Malayan faunas mix. In this ecoregion totaling 288,300 km² there are 27 protected areas that cover 15,948 km² (5% of the ecoregion). The Nam Ha NPA (2,240 km²) is the 4th largest of these protected areas in the region whereas 82 % of the protected areas of the ecoregion are smaller than 1000 km².

The WCS/IUCN National Protected Area prioritization model, that compared complementarities of mammal and bird specie richness and endemism, shows the Nam Ha National Protected Area as the 3rd ranking national protected area after Nakai Nam Thuen and Xe Paine (Ling 1999). The Lao Swedish Forestry Program Status Review of Protected Area in Lao PDR shows that Nam Ha National Protected Area lists in the top five National Protected Area tied with Nam Et Phou Loey and Phou Hin Poun for the third position (Robichaud 2001).

2. Habitats and vegetation

Luang Namtha Province has a broad altitudinal range 300-2094 m. that supports a wide variety of vegetation types. These include:

- ?? Hill evergreen and semi-evergreen forests;
- ?? Dry, temperate-like upland broadleaf woodlands;
- ?? Mature submontane and montane evergreen forests;
- ?? a mosaic of secondary habitats
- ?? several clear water rivers and streams, fed by a dense network of tributary streams
- ?? no wetlands of significant were identified here by IUCN, but the high peatland in Long District could be unique (Claridge 1996).

Biological survives identified the Southern Highlands zone, the Nam Kuaylong River valley and the spine of the Northern Highlands of the Nam Ha NPA to contain relatively undisturbed evergreen forest and grasslands (Tizard *et al.* 1997, Hedemark and Vongsack 2003). The flora of these forests is no doubt very rich and should be systematically surveyed.

3. Wildlife

Luang Namtha Province is home to at least 37 species of mammals, 297 species of birds and 65 species of fish (Tizard *et al.* 1997, Hedemark and Vongsack 2003). Reptiles and amphibians have not been surveyed. Key species are listed in Table 9 Mammals of significance are Clouded Leopard, Leopard, Tiger, Gaur, Asian Elephant, Black-cheeked Gibbon (Johnson, *et al* in prep) and a possibly unique muntjac species. BirdLife International list the Northern Highlands of the Nam Ha NPA as a globally Important Bird Area (Ouneham and Inthapatha 2003). Blyth's Kingfisher and Rufous necked hornbill being key species along with 56 species being restricted to the Sino –Himalayan Temperate and Subtropical forests.

Table 9. Key Species of Conservation Significance. Source: adapted from Tizard *et al.* 1997.

Key Species	Priority	Conservation Status	Remarks
Black-cheeked Crested Gibbon	Urgent	EN, VU	Population < 50. New population
Tiger	Urgent	EN	Population < 5, High trade /hunting threat
Asian Elephant	Urgent	EN	Population < 15, multiple threats
Dark Muntjac species	Urgent	DD	Reported, widely hunted
Gaur	Urgent	VU	Small population < 50 in remote areas
Asiatic Black Bear	Urgent	VU	High trade threat
Sun Bear	Urgent	DD	High trade threat
Pangolin species	High	NT	Present, hunted and traded
Pig-tailed Macaque	High	VU	Reported, hunted
Assam/Rhesus Macaque	High	NT	Present, hunted
Bear (stump-tailed) Macaque	High	VU	High trade/hunting threat
Golden Jackal	High	CS	Reported, hunted
Dhole	High	VU	Reported, hunted
Eurasian/Smooth-coated Otter	High	NT	Present, hunted and traded
Asiatic Golden Cat	High	NT	Reported, hunted
Leopard (ssp. <i>delacouri</i>)	High	CS	Present, hunted
Sambar	High	Regional Risk	Uncommon to fairly common
Chinese Goral/Southern Serow	High	CS	In steep, rocky areas
Black Giant Squirrel	Mid	CS	High hunting threat
Silver Pheasant	Mid	ART	Fairly common resident
Gray Peacock Pheasant	Mid	ART	Common resident
Grey-headed Lapwing	Mid	NT	Uncommon winter visitor
Blyth's Kingfisher	Mid	VU	Fairly common resident
Green Cochoa	Mid	NT	Uncommon resident
Hill Myna	Mid	ART	Uncommon resident
Rufous-throated Fulvetta	Mid	NT	Uncommon resident
Short-tailed Parrotbill	Mid	NT	Rare resident
Slow Loris	Low	CS	Common
Leopard Cat	Low	CS	Relatively common
Rufous-throated Partridge	Low	ART	Fairly common resident

IUCN threat categories:

CR = Critically Endangered: Facing an extremely high risk of extinction in the wild in the immediate future.

EN = Endangered: Facing a very high risk of extinction in the wild in the near future.

VU = Vulnerable: Facing a high risk of extinction in the wild in the medium term future.

NT = Near Threatened: Of a lower risk than, but close to qualifying as vulnerable.

DD = Data Deficient: Inadequate information exists to make a risk assessment for extinction.

CS = Special Conservation Significance in Lao PDR.

ART = At Risk in Thailand.

B Economic Evaluation

1. Watershed Protection

Watershed protection is important as it is used to support village water supplies, agriculture through fish and rice production and electricity generation along the Luang Namtha Plain. Mountain forests perform an important function because they can capture moisture from clouds. This moisture can amount to 20% of the total runoff in streams and rivers. Reduction of the canopy and complexity of the forest limits the amount of water that forest can capture for the valleys below.

Another important function is flood control. Forested hillsides hold water and release it slowly. Hillsides without forest lose water quickly and erode causing increased problems of flash flooding and spoiling of the river system. Erosion rates vary according to the land use type: paddy rice 10 tons /ha, upland crops 500 tons /ha, opened swidden areas 800 tons /ha, orchards 100 tons /ha and forest areas 3 tons /ha. If conservation measures are effected the erosion rates drop significantly. For example the erosion rate of upland crops with conservation is 40 tons/ha. (Oughton 1993).

2. Forestry

Five years ago there was a movement within Lao PDR towards a rational forest management policy, based on sustainable use of forest products than had occurred in the previous decade, as well as on conservation of essential habitat for maintaining biodiversity. Since that time, however logging has resumed “on large scale even in natural forest contrary to stated government policy.” (Berkmuller 2000). In the intervening years there have been several studies documenting the degree to which stated government forestry policy deviates from practice in the Lao PDR (GoL 2001b). Unfortunately, the experience in Luang Namtha Province confirms this more pessimistic view. The potential for the Northern Economic Corridor to become a major conduit for forest over exploitation cannot be ignored.

At the same time, there is hope for a future of sustainable forest management in Lao PDR if the production capability of the forest is not destroyed. The Department of Forestry along with the World Bank and the Swedish International Development Agency, have started a project that would call for demarcation of National Production Forests and, eventually, the development of sustainable forest management plans for every province in Lao PDR. The village-based joint cooperation framework and international certification processes may give the project a greater chance for success than previous forestry initiatives in Lao PDR.

3. Non Timber Forest products

A detailed valuation of NTFP collected by rural families in Luang Namtha Province has not been made to date. A recent study by MAF, IUCN and WWF (Rosales *et al.* 2003) provides figures that seem reasonable for Luang Namtha Province. Table 10 shows the market value of NTFPs collected by an average household to be \$398 per year. This is felt by the authors to be a conservative value. This figure multiplied by the number of households in Luang Namtha Province equals 4.5 million dollars on an annual basis.

Table 10. Market value of NTFPs collected by an average household. (Source: Rosales *et al.* 2003)

NTFPs	Average Quantity Collected per Household	Units	Average Price per Unit (Lao Kip)	NTFP Value per Household Based on Price (Lao Kip)
Bamboo	965.3	Meters	278	268,340
Bong bark	172.5	Kilos	333	57,443
Birds	16.0	Pieces	4,000	64,000
Bamboo shoots	118.6	Kilos	1,250	148,281
Cardamom	6.3	Kilos	14,000	87,500
Fish	40.9	Kilos	13,500	552,656
Frogs	27.4	Kilos	6,750	185,119
Fruits	44.2	kilos	900	39,797
Fuelwood	5.3	cubic meters	90,000	477,000
Honey	18.8	liter	8,500	160,087
Insects	1.56875	kilos	20,000	31,375
Leaves& grass	517.1	kilos	817	422,440

Mammals	0.4	kilos	10,000	3,750
Medicinal plants	12.0	kilos	10,000	120,000
Mushrooms	60.9	kilos	8,700	529,395
Rattan	381.0	meter	425	161,925
Reptiles	2.6	kilos	22,000	57,750
Timber for building	1.2	cubic meters	500,000	600,000
Tree-oil	16.9	liters	4,000	67,500
Vegetables	74.4	kilos	2,375	176,581
Wild chicken	0.4	pieces	15,000	6,000
Total NTFP value per household/year (Kip)				4,216,938
Total NTFP value per household/year (USD)				\$398

4. Potential Tourism Value

The National Tourism Authority of Lao PDR has identified Luang Namtha Province as having high potential for both cultural and eco-tourism. A pilot project for an eco-trekking trail has begun in the Nam Ha NPA that is supported by a larger UNESCO Luang Namtha Province eco-tourism project. Boating on the Namtha River organized by WILDSIDE Company and hiking in the hills organized by the Namtha Tourism Association are underway. While billed as nature tourism, the main experiences for guests of both these operations are cultural in nature, as wildlife and breath taking scenery are difficult to see. Should the culture 'quaintness' of the area be degraded, it is difficult to imagine what would draw tourists to the area other than drugs, which have been the drawing card for a certain sector of the tourist population.

Certain areas of Luang Namtha Province contains beautiful forests, rivers, small waterfalls, and caves of aesthetic interest and beauty. There are however many areas in the province where vegetation can be best described as "scrub," without much visual appeal. Hillsides burned by swidden agriculture are not lovely to the eye, and the smoke produced is not easy to breathe. Logging is mostly done at some distance to the road, so impacts are not visible from the highways, though they may well be to villagers living nearby. A high level of hunting in the area means that wildlife is mostly seen for sale in markets or in cages and birdsong is rarely heard, except deep in the forest.

The structures in villages include a wide variety of interesting and appealing architectural styles of the various ethnic groups. However, concrete structures are becoming more common. Often these buildings do not look as nice as more traditional structures, but their durability value is clearly important to their owners.

There are a number of cultural resources in the area. The most significant of these is a series of earthen "walls" that once surrounded the ancient city of Kou Vieng in Vieng Phoukha. Within these earthen walls are yet another set of earth walls that stood around the ancient Mahakot temple and a set of stupas. The "walls" are in fact a series of concentric berms and depressions, believed to have been built and excavated about 600 years ago. In places, the height from the base to the top of the "wall" appears to be close to 10 meters. The Luang Namtha Provincial Department of Information and Culture reports that there may be as many as three to five hundred individual sites of archaeological interest within the ancient city walls. Most of what is known about the site has been passed down through oral history. Local legends claim that it must have been giants who lived there, to have constructed such massive earthworks. To date, however, it has yet to be fully researched.

The Kou Vieng area is overgrown now with secondary forest and thick undergrowth, traversed only by footpaths and animal tracks. The center area, where the three stupas once stood, is virtually inaccessible. The site has already been subjected to looting. Bricks from the ruins of an ancient temple were used in the construction of the former Vieng Phoukha District office. There appears to be little concern about the removal of more bricks from the site. Some years ago, the head and hand of a Buddha image were found at the site of the ancient temple. The head was smashed open to see if there was anything of value inside. Given the minimal research in the past and the present isolation of this area, there is the strong possibility that undiscovered artifacts still exist there. Prevention of further damage to such heritage items should be a high priority, as improved access to the site will increase the looting.

The limestone cliffs between Ban Nam Eng and Ban Phoulán have caves that provide important habitat to bats and other wildlife, as well as being valued by local people. Inscriptions are carved into the wall of the largest dry cave. These caves are within a district protected forest area. Local people at Ban Nam Eng occasionally guide tourists to the caves near their village. People at Ban Phoulán have expressed interest in doing so, too, but they have not had any tourists. There are additional cliffs at Ban Nam Fa. Officials in Vieng Phoukha District report that caves in the Ban Nam Fa cliffs contain ancient Buddha- and elephant- image carvings. None of these limestone cliffs has been proposed for quarry activity, and should not be proposed as such in the future. There are other caves in the area that may very well contain carvings or artifacts of archaeological interest, and they should be assessed before any quarrying activity commences.

5. Genetic Resources and Scientific Research Value

Rice is currently the single most important crop in Lao PDR and much of Asia. Discoveries of economically important varieties and gene combinations have made large contributions to the global food security resulting in huge economic value. Traditional varieties maintained through the centuries by Lao farmers have contributed to the success of the Green Revolution and will no doubt contribute more in the future. The economic value of this contribution is not known, however. Likewise the botanical treasure trove in the forests of Luang Namtha Province in the ecotone area between the Himalayan and Indochinese bioregions is sure to hold many unnamed species and possibly unknown and useful biochemical substances.

C. Issues and recommendations

1. Wildlife Trade

In recent times, wildlife sales have become a means of obtaining not only rice but also other household goods and medicine. Unfortunately this means of obtaining money is no longer sustainable with the improved technology (guns, flashlights, steel snares and explosives, etc.). Equally unfortunate is that the economic value of wildlife to the villager pales into insignificance beside the profits made from the wildlife trade. Globally illegal wildlife trade is estimated to be more than US\$8 billion, second only to illegal drugs.

At this time the trade off to villagers does not seem too difficult, as short term - small profit is readily traded for long-term future food security. This discussion will become increasingly more difficult as wild resources become scarcer and food security is lost during drought or flood periods. The end result is that villagers sell wildlife for next to nothing while undermining their future food security (Johnson et al 2003). The government and aid agencies will soon be in a race to fill the void left by the loss of these natural resources to outside buyers.

Wealthy Lao people are one of the main buyers of wildlife. Lao Airline pilots are often seen carrying wildlife back to Vientiane for sale to restaurant suppliers. Chinese Traditional Medicine merchants are the other large buyer of wildlife. Luang Namtha municipality, Boten, Nátœi Xieng Kok and Muang Sing are known as trading nodes in the wildlife network (Nooren and Claridge 2001). Import-Export businesses are numerous in Luang Namtha Province and enforcement of wildlife regulation minimal. Note the Import/Export businesses in Luang Namtha also manages the elephant circus outside Nátœi.

2. Issues of Land Use

In Luang Namtha Province there have been some conflicts over land use between sustainable resource management and economic development. Coordination between the NPA, and other government sectors as well as with the Provincial Planning Committee could be improved. In general it seems that the current biodiversity loss and the spoiling of the environment is an expected cost for national development or a cost that should be paid by the international community. This is exemplified by the following situations.

Mining

The gravel quarry within the NPA on Route 17 is extracting a resource from the protected area but no royalties are earmarked for the NPA. This could be an important source of sustainable funding for the protected area. Oil and other solid wastes should be kept from going into the river and workers should not be eating or trading wildlife.

The Vieng Phoukha Coal Mine Company is the chief industry in Vieng Phoukha District. Officials report however that there has been some environmental damage as a result of the lignite mine such as paddy

loss, dust and other related pollution. But only when pressed, has the Company established a system of payments to farmers based on agricultural production lost each year. The Company had promised to build a primary school in Ban Nam Ngeun to serve that village and the three surrounding villages, but it has not been built. The Company has also promised a gravity-feed water system; but they have not begun one yet. Presumably the Company pays taxes to the national and provincial governments, so there must be some benefit to the Lao; but it does not seem to translate to any benefits for the people who must breathe in the coal dust, road dust, and fumes.

Transportation Integration

While the livelihoods of the people in the area could be greatly enhanced by improved roads, there is a significant risk that their lives could be made worse if the environment on which they depend is subject to overexploitation or bad people spread disease from other regions. Current and future road projects must educate people to these risks and establish checkpoints to monitor and enforce laws. According to the *Participatory Poverty Assessment Lao PDR* (GoL 2001a), people of the northern region rank lack of road access after such problems as poor land allocation practices, livestock disease, loss of soil fertility, environmental degradation, agricultural pests, and opium addiction. Road development must be followed by more concrete poverty reduction interventions.

Current and future road projects must monitor and regulate workers and construction practices, especially when they are working within a protected area. International best practice should be followed and enforced if not followed.

Swidden Agriculture Reduction

Because of increased population and limited available swidden land for land use allocation, fallow periods have been reduced resulting in accelerated soil erosion and loss of soil fertility. A number of villagers have reported that their swidden lands are no longer productive enough to support their households. In some of these villages, former swidden land is now given over to village conservation land (ADB 2002b). Efforts should continue to intensify landuse and to refine land allocations in problem areas.

Agricultural intensification

Rice paddy and rubber plantation development within the protected area should be done in full consultation with the protected area staff and planned in such a way not to force wildlife out of the protected area as is the case with the elephants now raiding crops in Muang Sing District.

Villages within the protected area should be encouraged not to allow their cattle to roam freely within the protected area where they can easily fall prey to carnivores. Forage intensification and 'cut and carry' livestock rearing should be promoted.

The unique wetlands in the northern highlands of the Nam Ha NPA in Long District near Ban Pinho should not be converted to paddy land until a detailed environmental assessment is completed.

International rural development projects should integrate sustainable wildlife harvesting in their livelihood improvement strategies. Sole reliance on intensification of domesticated crops leaves villages vulnerable when crops fail.

Tourism promotion

The first phase of tourism promotion in Luang Namtha Province has been a financial success for the industry. The next phase should work to insure that traditional cultures are maintained as international visitation increases and that the profits from tourism are equitably distributed to villages and the protected area.

Care should also be taken and consultation made with specialists when developing tourism treks to see highly endangered species, such as the Black-cheeked Crested Gibbon or Guar.

Production Forestry

All logging within the protected area, even for agricultural intensification, should be done with the full consideration of the goal of the protected area and consultation with the protected area staff. Revenues earned from trees taken from the protected area should be returned to the protected area and not kept as profit

for the company. In the past, it has been the provincial tourism authority that has stopped logging near Ban Nammak Mai that would have impacted a tourism trek. Revenues from trees removed for rice paddy and road development along Route 3 and Route 17 have not been given to the protected area (nor have the equivalent in tax royalties.)

3. Wildlife as agricultural pests

Upland farmers, but not lowland farmers report rats and birds in the rice as a significant problem. It is estimated that 15% of the rice crop is lost to rodents in a normal year and 50% can be lost during a rodent “eruption”. Wild animals are not mentioned at all by lowland farmers and rank lower than domestic livestock as pests by upland farmers (Schiller *et al.* 2003). Indiscriminate use of rodenticide, kill natural predators as well as rodents leaving the farmer more vulnerable to future rodent damage and increasing the likely hood of eruptions. Integrated pest management should be promoted to manage this problem.

Endangered species conservation does not come without costs. Recent crop raiding by elephants near Muang Sing is an example of this. Villagers need to be compensated, and studies need to be done to determine the extent of the damage and the reason the elephants are leaving the protected area. Proactive measures should then be put in place to stop further raiding.

Livestock losses to carnivores are most often the result of livestock grazing far from villages and into the protected area, and the natural prey base of the carnivore being over harvested by people. Villagers should be encouraged to keep livestock closer to home and the protected area core zoning enforced to allow natural prey items like deer to recover.

D. Gaps in the Knowledge

While the Nam Ha NPA has had one of the longest running foreign assisted management program of all the protected areas in Lao PDR, there still remain gaps in the knowledge. These are:

- ?? What plants, reptiles and amphibians are found in Luang Namtha Province?
- ?? What is the regional biodiversity value of the high peat lands in Long District?
- ?? What is the natural ecology of the rodent species plaguing upland farmers? And how can this problem be reduced?
- ?? What is causing the elephant to leave the Nam Kong area of the NPA and raid fields near M. Sing? How can this problem be mitigated?
- ?? Who are the wildlife traders and how can they be persuaded to stop this destructive activity that threatens food security?
- ?? Is the ‘dark’ muntjac reported in the area a new species or a disjunct population from the Sayphou Louang range?
- ?? What is the size, extent and viability of the Black-cheeked Crested Gibbon population and what management is required to maintain the species in the Nam Ha NPA?
- ?? What mechanism can be put in place to domestically fund the Nam Ha NPA?

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XI. Appendices

A **Key species in Luang Namtha Province** (Source: Tizard *et al* 1997, Hedemark and Vongsa 2002, Johnson *et al* 2003)

Keys species of mammals are all species included in the IUCN Red List of Threatened Animals (IUCN 1996) and species listed by Duckworth (1999) to be of “Special Conservation Significance” in Lao PDR - i.e., species that are not considered to be threatened on a global scale, but are regionally rare, or occupy a restricted range.

Key species of birds are all species listed in the IUCN Red List of Threatened Animals IUCN (1996), which follows Birds to Watch 2, the World List of Threatened Birds (Collar *et. al.*, 1994) and species listed by Treesucon and Round (1990) as being At Risk in Thailand.

Mammal taxonomy and systems follow Corbett and Hill (1992). Taxonomy and nomenclature for birds follow Inskipp *et al.* (1996).

1. Mammals

Sunda/Chinese Pangolin *Manis javanicus/pentadactyla*

World Range: Sunda Pangolins are found throughout most of Southeast Asia south of ca. 20°N, into the Sundas, Indonesia, and Palawan, Philippines. Chinese Pangolins are found from Nepal to southeast China and in Southeast Asia south to ca. 20°N (Corbett and Hill 1992). Conservation Status: IUCN Near Threatened • CITES Appendix II •

In Lao PDR, pangolins are still widespread but declining due to hunting and trapping for food and the wildlife trade (Salter 1993). Luang Namtha Province villagers report two kinds of pangolins in the area: buffalo pangolin and cow pangolin. Cow pangolins are said to be smaller and redder in color, while buffalo pangolins are larger and blacker. Presumably these refer to the Chinese Pangolin *Manis pentadactyla*, which replaces the Sunda Pangolin *Manis javanica* north of ca. 20°N in Lao PDR (Corbett and Hill 1992). However, confirmed identification of species could not be achieved through village interviews.

Villagers report pangolins in all areas. Pangolin burrows were seen in both the Nam Kong and Long District locations. Often these holes also showed sign of human digging. Villagers report that pangolin numbers are declining due to heavy hunting for trade.

Slow Loris *Nycticebus coucang*

World Range: Slow Lorises are found from northeast India to extreme southern China, throughout Southeast Asia and into Borneo, Sumatra, and Indonesia (Corbett and Hill 1992). Conservation Status: Special Conservation Significance in Lao PDR • CITES Appendix II • LPDR Management Category II

Virtually all the local villagers were familiar with slow loris, and most report them to be relatively common. Reliable separation of Slow Loris from **Pygmy Loris**, *Nycticebus pygmaeus*, is impossible based on the anecdotal information provided by local people. Informants suggest that only one species of loris occurs in the region.

Black-cheeked Crested Gibbon *Hylobates concolor*

World Range: Northern Lao PDR, southern China and northern Vietnam.-Conservation Status: IUCN Globally Threatened-Endangered • CITES Appendix I • LPDR Management Category I. The population in China, through greatly reduced is thought to be the most substantial.

Three families of gibbons were found near Ban Phinhoe in Long District, Nongpaset in Nale District and Ban Cha Kurn in Vieng Phoukha District within the Nam Ha NPA in 2003 (Johnson *et al* 2003b). Another small population is known from Bokeo Province (Eric Pasquet pers. comm.). Gibbons are said to call in the cold months.

In Ban Nam Kong, they report that gibbons have not been seen since the late 80's (1989). None were found in the 2002 and 2003 surveys for this species. They also report that the Akha hunt them for food and fur. Reports from UNESCO and villagers in Ban Mok Chong, Nale District state that gibbons were heard in 2001.

Macaque sp. *Macaca*

A group of ten macaques was seen in February 1997 in the Nam Khouay Nong Valley, and a single macaque was seen on the Nam Tha in April. It was not possible to identify the species at either sighting. There is a possibility that these sightings were Rhesus Macaques, *Macaca mulatta*, which may occur in the area. Two young Rhesus Macaques were being held in captivity at the main hotel in Luang Namtha municipality in November 1997. They were reportedly captured in the forest close to the town.

Macaques were seen on two occasions during the 2002 survey, once by guides along the Nam Yay River and once along the Hua Nam Louang Noy River by the team. The Nam Yay River troop is reported to be about 10 individuals while the Hua Nam Louang Noy River troop is reported to be about 20. Villagers say there are many macaques in the NPA and that there are several species. The ones observed in flight along the Nam Louang seemed to be Assamese, based on their short tail and long fur. However, definite identification is not certain.

Pig-tailed Macaque *Macaca nemestrina*

World Range: Pig-tailed Macaques are patchily distributed from Burma and Vietnam south to Malaya, Sumatra and Borneo (Corbett and Hill 1992). Conservation Status: IUCN Vulnerable • CITES Appendix II • LPDR Management Category II

Although there is some confusion about the number of species of macaques in the area, interviews with villagers suggest that this species occurs in Nam Ha NPA. A single individual was found captive at the largest hotel in Luang Namtha municipality in November 1997. It had apparently been bought from traders who claim it had been captured in the forest of Luang Namtha Province.

Assamese Macaque *Macaca assamensis*

World Range: Found from central Nepal, across southern China and northern Southeast Asia (Corbett and Hill 1992). Conservation Status: • CITES Appendix II • LPDR Management Category II.

In the Northern Highlands a group was seen in February 1997 in secondary evergreen forest ca. 2 km north of Ban Tonglat Gao

Bear (Stump-tailed) Macaque *Macaca arctoides*

World Range: From northeast India into southern China, western Southeast Asia into Malaya, with some scattered populations in Lao PDR, Vietnam and Cambodia (Corbett and Hill 1992). Conservation Status • IUCN Vulnerable • CITES Appendix II • LPDR Management Category II

In the Nam Kong area, village interviews indicate that this species occurs in the area. Hunting intensity is high within the NBCA. Consequently, any primates are likely to be very shy and difficult to observe. Further field surveys are required to determine which species occur in different parts of the NBCA and what their relative distributions are.

Dhole (Asiatic Wild Dog) *Cuon alpinus*

World Range: Dholes occur patchily from Siberia through Mongolia, northwest China and down through much of India, throughout Southeast Asia from south China to Malaya and into Sumatra and Java, Indonesia (Corbett and Hill 1992, Lekagul and McNeely 1988). Conservation Status: IUCN Vulnerable • CITES Appendix II • LPDR Management Category II

There have been no direct observations of Dhole during field surveys. Villagers report wild dogs occurring across much of the NPA. Villagers in Long District report two kinds of wild dog. One kind hunts in packs (Dhole) and the other kind hunts alone (jackal). They also report that wild dog populations are high because people do not hunt them. Precise localities of sightings or even general areas that they frequent were not obtained. Dog tracks were seen at both Nam Louang and Nam Kong 2002 survey locations far from villages.

Golden Jackal *Canis aureus*

World Range: Golden Jackals range from central Africa north to southeastern Europe and across Arabia and India to Burma, Thailand and western Lao PDR (Corbett and Hill 1992). Conservation Status: LPDR Management Category II

Villagers in Ban Huoay Hoc, Luang Namtha Plain convincingly report the presence of Golden Jackal. This species current status in Lao PDR is very poorly know. It is most likely threatened by hunting.

Asiatic Black Bear *Ursus thibetanus*

World Range: From Japan into northeast China and across the eastern ramparts of the Tibetan Plateau extending along the Himalayas westwards to Afghanistan, and through southern China into Burma, northern Thailand, Lao PDR, Vietnam and Cambodia (Corbett and Hill 1992, Lekagul and McNeely 1988). Conservation Status: IUCN Vulnerable • CITES Appendix I • LPDR Management Category I

In the Northern Highlands, droppings of this species were found daily around the 2,094 m. Peak in 1997. In this same area, an unidentified bear was flushed from the canopy of a tree. The villagers of Ban Phinho report shooting bears, which raid their maize fields, and then selling the parts to Chinese traders. Bear signs were seen in Nam Kong area in 2002 though no fresh scat or footprints were found. An Asiatic Black Bear was being kept at the German Agency for Technical Cooperation's (GTZ) headquarters in Muang Sing. The bear was given to the owner as a New Year's gift by a local villager.

Sun Bear *Ursus malayanus*

World Range: Northeast Indian into southwest China and throughout Southeast Asia, into Sumatra and Borneo (Corbett and Hill 1992). Conservation Status: IUCN Data Deficient • CITES Appendix I • LPDR Management Category I

In the Nam Kong area, tracks of this species, as well as reports from villagers, were noted in 1997. Bear scratch marks (not attributable to a species) were found on a tree on the edge of tall grassland at 1,400 m. above Ban Tonglat Gao, and bear scat (identified by its size and sweet honey-like odor) was found in three locations above the Huoay Chi and along the Huoay Lapou-a-ye, all in secondary evergreen forest between 880 m. and 1,350 m. Many villagers report that both Asiatic Black Bear and Sun Bear are hunted for their bones, gall bladders, claws, and other unspecified parts, primarily to sell to Chinese traders. A single gall bladder would apparently be sold for 80,000 kip or more in 1997. The sale of bear parts is a growing industry in Lao PDR. Gall bladders in the Vientiane morning market are being sold for several hundred dollars each and their supply is being replenished regularly. In 1997 a large hotel in Luang Namtha municipality keep a young Sun Bear as a 'pet' in a small enclosure with rabbits and guinea pigs. It had been purchased from a village outside Luang Namtha, where apparently the mother was a captive.

Back-striped Weasel *Mustela strigidorsa*

World Range: From eastern Nepal across southern China and northern Southeast Asia (Corbett and Hill 1992). Conservation Status • IUCN Data Deficient

In the Luang Namtha Plain a single weasel was observed in 1997 in a moist stream valley in evergreen forest at approximately 720 m. There have only been two reported observations of this poorly known species in Lao PDR. The paucity of records throughout this species' range is probably related to the limited fieldwork that has been conducted in this area and the species may prove to be more widespread although at low densities.

Eurasian/Smooth-coated Otter *Lutra lutra/Lutogale perspicillata*

World Range: The Eurasian Otter occurs over most of the Palearctic while Smooth-coated Otter is found from Pakistan through India across to southern China, through much of Southeast Asia extending into Sumatra, Java and Borneo (Corbett and Hill 1992, Lekagul and McNeely 1988). Conservation Status: IUCN Insufficiently Known/ IUCN Near Threatened • CITES Appendix I/CITES Appendix II • LPDR Management Category II

In the Luang Namtha Plain several tracks / spraints of a large otter were seen in 1997 on the Nam Oun Noy River. Local people report the presence of otter on most larger streams within the NPA. In 2002 tracks

were seen along Nam Yay River in Nam Kong and skeletal remains were found at a hunting camp along upper Nam Louang. Villagers report Chinese buyers pay 400,000 kip (\$40) for a 70cm. pelt. Villagers report that the Eurasian Otter is less desirable for the fur trade than the smooth-coated otter.

Leopard Cat *Prionailurus bengalensis* not confirmed

World Range: From North Korea through China, much of the Indian subcontinent and the whole of Southeast Asia and into the Philippines, Borneo, Sumatra and Java (Corbett and Hill 1992, Lekagul and McNeely 1988). Conservation Status: Special Conservation Significance in Lao PDR • CITES Appendix I • LPDR Management Category II

The Leopard Cat is evidently still widespread, and probably relatively common throughout much of the region. Occasional scat and tracks from small cats were found along most trails. Much of it was probably from Leopard Cat, *Prionailurus bengalensis*, which local people in the NPA recognize.

Asiatic Golden Cat *Catopuma temminckii*

World Range: Nepal to south (and sparsely in central) China, south through much of Southeast Asia, and into Sumatra (Corbett and Hill 1992). Conservation Status: IUCN Near Threatened • CITES Appendix I • LPDR Management Category II

Medium size cat tracks were found in the Nam Kuaylong Valley in 1997, which probably refer to this species. In village interviews conducted by the WCS Community-Based Conservation Project, the species was reported to occur in the Northern Highlands area. Villagers report medium sized cats in the NPA but at low numbers (Phiapalath 1996). A skin of a Leopard Cat was seen in the village of Ban Nam Louang. In 2002

Leopard *Panthera pardus*

World Range: Extensive, spanning two continents from Africa across to southern and eastern Asia, south through Southeast Asia to Malaya and Java (Corbett and Hill 1992, Lekagul and McNeely 1988). Conservation Status: Special Conservation Significance in Lao PDR • CITES Appendix I • LPDR Management Category I. Several subspecies are listed in the IUCN Red List of Threatened Animals (IUCN 1996), but this does not include *P. p. delacouri*, which occurs in Lao PDR. In Indo-Malaya it is now only sparsely distributed across the less densely populated parts of its range (Corbett and Hill 1992).

In 1997 in the Northern Highlands scat, containing a lot of pig hair, almost certainly belonging to one of these two species, was found regularly along the main trail (between 950 m. and 1,100 m.), ca. 2 km north of Ban Tonglat Gao, and along one or two side trails in the vicinity. There were also several large cat scrapes along the trails here (ca. 50 x 30 cm.), further suggesting one of these two species. In the Luang Namtha Plain tracks were found at the mouth of the Nam Oun-roy in 1997 and a large scat (ca. 12 cm. long, ca. 1.5 cm. diameter), containing finer hairs (? ungulate), probably from a Leopard or Clouded Leopard, *Pardofelis nebulosa*, was found in evergreen secondary growth ca. 2 km. south of Ban Nam Mai. In Nam Kong area tracks were recorded in the Nam Kong Valley. During discussions with villagers, there appeared to be considerable confusion between descriptions of Clouded Leopard and Leopard. On August 26 2002, a 2-year old cow was killed 1 km. from Phimhoe village in Long District. Villagers claim, and investigation confirmed, that the cow was killed by a leopard. Villagers report that this leopard has also killed other cattle in the area.

Tiger *Panthera tigris*

World Range: Extremely reduced in number since historical times, it now occurs in a number of isolated populations in Siberia and China, the Indian subcontinent west to the Caspian Sea, and in Burma, Thailand, Lao PDR, Cambodia, Vietnam, Malaysia and Sumatra (Corbett and Hill 1992, Lekagul and McNeely 1988). The subspecies in Lao PDR, Vietnam and Cambodia is *P. t. corbetti*. Conservation Status: IUCN Endangered • CITES Appendix I • LPDR Management Category I.

Although it is apparently still relatively widespread in Lao PDR, the population is now greatly reduced and fragmented (Salter 1993). In 1997 in the northern highlands, relatively fresh tiger scat was found in secondary evergreen forest at Pong Nam Chat salt-lick (980 m.) and in tall grassland between 1450 m. and 1,500 m., ca. 2 km. north of Ban Tonglat Gao. Pug marks were found along the Huoay Lapou-a-ye

streambed (ca. 870 m.) in the Ban Nam Ya area. In the Ban Huoay Hoc area, Tigers were reported to have killed at least 10 domestic buffalo during the past year. Luang Namtha Plain Tigers have been killed with the provincial authorities permission in Nale District near Ban Hatgnaleng. These animals were reportedly killed by booby traps, explosives in livestock carcasses. In the Nam Kong area there was no physical evidence, but villagers reported Tigers taking domestic buffalo. Most villages reported losing livestock to Tigers. Water buffalo are allowed to roam unattended, often some distance from the nearest village. They quite obviously represent a considerable prey biomass to Tigers in a region where the populations of their preferred prey species (Sambar, muntjacs, Gaur and Banteng) have been greatly reduced. Local people generally seem willing to kill Tigers, although some consider Tigers too dangerous to hunt. One stated reason for hunting them was to protect livestock. The wildlife trade provides another major incentive to hunt Tigers, and various body parts are sold to traders from both China and Thailand, according to some informants.

In 2002, villagers in the protected area report Tiger tracks only in the area between Nale village and 2094 m. Peak. A large track was observed by earlier patrol teams (Johnson and Parisack 2002). At this time it is estimated that there are fewer than three Tiger in the NPA.

Asian Elephant *Elephas maximus*

World Range: The Indian subcontinent and Southeast Asia, Sumatra and Borneo (Corbett and Hill 1992). Once widespread, it has now been reduced to scattered, isolated populations. Conservation Status: IUCN Endangered • CITES Appendix I • LPDR Management Category I

Salter (1993), citing Vongphet (1988), states that available estimates for the Lao elephant population range from 2,100 to 3,300, and that elephants are not immediately endangered in Lao PDR. However, the situation has greatly changed since 1988, and the species is now undoubtedly 'threatened' in Lao PDR. In 1997 in the Nam Kong area, old tracks were found and reports indicate that a small population uses the Lao/China border region. Numerous tracks and dung piles were seen in the northern reaches of the Nam Kong in 2002 but all were 1-3 months old, according to the guides. Villagers report that the elephants come to Lao PDR in the wet season and return to China in the dry season. They report that the herd is smaller in recent years, with only ten individuals seen last year. Villagers report that elephants are killed. In 2002, two Lao men near Sing municipality killed an elephant for ivory. One man has been arrested and the tusks confiscated. The elephant was killed with six shots from a military rifle. The tusks are with the Luang Namtha Provincial governor.

Sambar *Cervus unicolor*

World Range: Widespread across India to south China and south to Malaya, into Sumatra and Borneo (Corbett and Hill 1992) and the Philippines (Lekagul and McNeely 1988). Conservation Status: Regionally at Risk • LPDR Management Category II

This species is not considered by some sources to be of conservation concern; however, its number has declined in Lao PDR, Vietnam and Cambodia as a result of intensive hunting pressure. In 1997 in the Nam Kong area, signs of the Sambar were encountered frequently, suggesting a population greater here than in other NPAs in Lao PDR. Occasionally Sambar alarm calls were heard in scattered locations across the whole area. Tracks and droppings were found in a number of localities, particularly in areas of dense secondary growth along watercourses. In 2002 very few signs of Sambar were seen in these same areas.

Dark muntjac *Muntiacus sp.*

Villagers consistently report a larger, darker muntjac than the common Indian Muntjac, *Muntiacus muntjak*. This species may prove to be Roosevelt's Muntjac, *Muntiacus rooseveltorum*. However, further information is needed. A more specific survey should be undertaken to determine the identity and ecological relationships of this species.

Gaur *Bos gaurus*

World Range: Formerly a widespread species whose range has become very fragmented in recent times, now occurring in disjunctive populations in the Indian subcontinent, and from south China south through Southeast Asia to Malaya (Corbett and Hill 1992). Conservation Status: IUCN Vulnerable • CITES Appendix I • LPDR Management Category I

Gaur has undergone a decline in Lao PDR and is now confined to remote and relatively undisturbed areas (Salter 1993). Eight to ten Gaur remain in the southern sector of the Northern Highlands in the vicinity of Ban Tonglat Gao. A single bull was seen briefly here in 1997 as it was flushed from eating bamboo shoots at 1880 m., and a bull was seen in grassland north of 2094 m. Peak after having been flushed from eating banana trees. Fresh evidence (feces and tracks) was found in 1997 at Pong Nam Chat mineral-lick. There were also numerous tracks and feces in the grassland, wild bananas and secondary growth above our 1,280 m. camp, ca. 2 km. north of Ban Tonglat Gao, and also crossing the main trail between there and Pong Nam Chat. Villagers appear to know the movements of the herd in the Tonglat Gao area reasonably well, saying they tend to spend a lot of time in the 2,000 m. ridge area, and occasionally come to visit Pong Nam Chat. A smaller herd of 2-3 individuals is reported to use grasslands to the northeast of the 2094 m. Peak. In Luang Namtha Plain in 1997, tracks of a single animal were seen along the bank of the Nam Oun Noy in riparian evergreen forest. Reports of individuals and small groups came from most villages although they noted the species was usually only transitory. Local people apparently no longer hunt Gaur, for cultural reasons. However, it is not clear for how long they have stopped.

Gaur were reported three days prior to our arrival at the Nam Louang River grassland near Ban Phimhoe in 2002. We did not see any tracks however. In 2002 villagers no longer reported Gaur along the Nam Kong, Nam Ou or Phu Nam Mat.

Southern Serow (*Naemorhedus sumatraensis*)

World Range: The Southern Serow ranges from the western Himalayas to south central China, down through Southeast Asia and into Sumatra (Corbett and Hill 1992). Conservation Status: Special Conservation Significance in Lao PDR • CITES Appendix I • LPDR Management Category I.

Serow droppings (identified by their larger size and more angular, oblong shape compared with Goral) were found in grassland and secondary growth above our 1,280 m. camp, ca. 2 km. north of Ban Tonglat Gao in 1997. Single sets of Serow horns were seen in two houses, one in Ban Nam Ya and one in Ban Huoay Hoc. A tourist, in communications with WCS, sent photos of three serow at a small waterfall south and west of where the Nam Ma crosses Route 17 in 2002.

Chinese Goral *Naemorhedus caudatus*

World Range: Chinese Goral is found from eastern Russia south through China to northern Southeast Asia. Conservation Status: Special Conservation Significance in Lao PDR • CITES Appendix I • LPDR Management Category I.

This species is reported in the steeper, rockier regions within the Nam Ha and Nam Kong Protected Areas.

Black Giant Squirrel *Ratufa bicolor*

World Range: Ranges from northeastern India and Nepal to extreme southern China and south to Malaya, Sumatra, Java and Bali, Indonesia (Corbett and Hill 1992). Conservation Status: Special Conservation Significance in Lao PDR • CITES Appendix II • LPDR Management Category I.

In 1997 in the Northern Highlands, two or three individuals were seen regularly in mature evergreen forest between 1,100 m. and 1,300 m. along the Huoay Gnere. On the Luang Namtha Plain, one was seen at 720 m. in tall bamboo and in the secondary evergreen forest on limestone by the Nam Mai. This, coupled with the species' distinctive appearance, large size and diurnal habits, suggests it is subject to fairly intense hunting pressure in Nam Ha.

In 2002 Black Giant Squirrel was seen at the single fruiting Mulberry tree in the Nam Kong area on two occasions. Villagers in all parts of the protected area report seeing them.

2. Birds

Rufous-throated Partridge *Arborophila rufogularis*

World Range: North India to southwest China, including northern Southeast Asia (King *et al.* 1975). Conservation Status: At Risk in Thailand • LPDR Management Category II

In the Northern Highlands this species is common in evergreen forest and secondary growth (including scrub and stands of wild bananas) above 1,300 m., with up to ten seen/heard per day. This species occurs in most areas in Lao PDR over 1,500 m. and although sought by hunters, it is not immediately threatened.

Bar-backed Partridge *Arborophila brunneopectus*

World Range: Southwest China to the Greater Sundas, including most of Southeast Asia (King *et al.* 1975). Conservation Status: At Risk in Thailand • LPDR Management Category II. It is still widespread, locally common and under no immediate threat in Lao PDR (Thewlis *et al.* in press)

In 1997 in the Northern Highlands this species is common in hill evergreen forest up to 1,500 m., with up to five groups heard per day. In the Louang Namtha Plain it is common in all forest types and scrub from 700 m., with up to four groups heard daily. In the Southern Highlands this species is frequent in all forest types and scrub up to 1,500 m., with three to five groups heard daily. In 2002 birds were heard frequently calling in the Nam Kong area. They were much less frequently heard in the Northern Highlands. It is one of several species targeted by hunters using snares set for ground-feeding birds (primarily *Galliformes*). Often seen for sale in Luang Namtha municipality market and kept as pets. They are frequently kept alive by hunters to act as lures to attract wild partridges. It appears to be replaced by Rufous-throated Partridge above 1,500 m.

Silver Pheasant *Lophura nycthemera*

World Range: South China and Southeast Asia, excluding peninsular Thailand and Malaysia (King *et al.* 1975). Conservation Status: At Risk in Thailand • LPDR Management Category I. It is widespread and locally common in Lao PDR (Thewlis *et al.* in press), although a continuation in the current levels of hunting must be a cause for concern in the medium term.

In 1997 in the Northern Highlands, groups were encountered three times, mostly in montane evergreen forest or in secondary growth and bamboo. All of these sightings were around Ban Tonglat Gao and 2,094 m. Peak. In the Luang Namtha Plain, a female was shot by a Lao Theung guide and two males were seen in the Nam Oun-noy Valley. In the Southern Highlands thirty-two individuals were seen in a two-day period along the 1200 m. ridge south of the Nam Ha. Densities in this zone were higher than other areas surveyed in Lao PDR in 1997. In 1997 silver pheasant was evidently hunted with some regularity as feathers from the species were found by trails on numerous occasions, where birds had been plucked prior to being cooked and consumed, and several houses in the villages had animals as pets or displayed silver pheasant feathers. In 2002 the only encounter was one set of feathers from a garden hut in the Long District, but they were frequently for sale at the Luang Namtha market before enforcement activities began.

Grey Peacock Pheasant *Polyplectron bicalcaratum*

World Range: Eastern Himalayas, Burma, western Thailand (excluding peninsula), central and northern Vietnam and Lao PDR (King *et al.* 1975). Conservation Status: At Risk in Thailand • LPDR Management Category I. It is widespread and locally common in Lao PDR, and although hunting pressure is high, it does not appear to be under immediate threat.

In 1997 in the Northern Highlands, it was heard daily in evergreen forest, with a male and female seen in rattan undergrowth. This species was considerably more common around Ban Tong Lat Gao and the 2,094 m. Peak with up to ten birds heard per day. In the Luang Namtha Plain it was heard daily in older secondary forest with up to five birds calling per day. Two different birds were flushed along the Nam Oun-noy in 1997. In the Southern Highlands it was heard daily although at lower frequencies than in other zones with fewer than three birds being heard per day. Few sets of feathers were found, but six birds were discovered for sale (asking price 2,000-2,500 kip or the equivalent of US\$2-2.50) in the Luang Namtha municipality markets. In 2002, Grey peacock pheasant were calling all day long in hill forest and gallery habitat of the Nam Kong, but few were heard in the Ban Thong Lat area contrary to reports in 1997. In the Nam Kong area they seem to call almost hourly with a three-note call. Like other *Galliformes* this species is highly sought by hunters and at risk from hunting and snaring pressure.

Short-eared Owl (*Asio otus*)

World Range: Winter visitor in the north. Habitat in Lao PDR unknown, probably open grasslands and wetlands.

A patrol team photographed a short-eared owl in the Luang Namtha municipality market in 2002.

Grey-headed Lapwing *Vanellus cinereus*

World Range: It breeds in northeast Asia and migrates to India, China, Southeast Asia, Taiwan and the Philippines (King *et al.* 1975). Conservation Status: IUCN Near Threatened • LPDR Management Category II

In 1997 in the Luang Namtha Plain one was seen resting and preening on a bund, in dry paddies west of Luang Namtha Airport and a group of seven was seen in a dry paddy field north of the Sing Long District Road. They were also seen in extensive paddies in both the Luang Namtha and Muang Sing Basins. Dry fields and paddies are a favored wintering habitat of grey-headed lapwings. This species is likely to be more numerous in the area than these records may suggest.

Hornbills

Oriental Pied Hornbills were seen and heard along the Nam Kong in 2002 and a Rufous-necked Hornbill was photographed in Ban Nam Mak Kao village while doing wildlife hunting and trade research.

Crimson-breasted Woodpecker *Dendrocopos cathpharius*

World Range: Nepal to western China, including northern Southeast Asia (King *et al.* 1975). Conservation Status: At Risk in Thailand

In 1997 in the Northern Highlands one bird was sighted at forest edge at 1440 m. between Ban Phimho and the 2094 m. Peak. This is the first recent record in Lao PDR and without more data the species' status in Lao PDR cannot be determined.

Blyth's Kingfisher *Alcedo hercules*

World Range: Sikkim to southwest China and northern Southeast Asia (King *et al.* 1975). Conservation Status: IUCN Vulnerable

In 1997 in the Northern Highlands one species was sighted at 1,000 m. along a stretch of the Huoay Chi passing through secondary moist evergreen growth, bananas and opium fields. In the Luang Namtha Plain one pair was sighted at 700 m. where the main trail crosses the Nam Mai River, which is flanked by tall bamboo and secondary growth. The pair was being chased by a Common Kingfisher, indicating a territorial boundary between the two species. One was seen on the Nam Phoun, a small tributary of the Nam Kuay Long, in open, old secondary forest. Individuals were seen flying along the Nam Kuay Long. Occasionally these birds utilize an area dominated by banana plants and surrounded by scrubby second growth. Apparently suitable habitat (2-5 m. wide shaded streams and small rivers) exists throughout much of the area surveyed, and Nam Ha is likely to support a significant population of this globally threatened species. No birds were seen on the 2002 survey.

Crested Kingfisher *Ceryle lugubris*

World Range: It occupies a wide range encompassing the Himalayas, from Pakistan to Burma, southwest China, Japan, north Thailand, Vietnam and Lao PDR (King *et al.* 1975). Conservation Status: At Risk in Thailand. It is widespread in northern Lao PDR and along the Annamites, and under no immediate threat (Thewlis *et al.* in press).

In 1997 in the Luang Namtha Plain one species was sighted along the Nam Mai where the Blyth's Kingfishers (see above) were seen. Individuals were seen daily on the lower Nam Kuay Long in April, possibly representing a pair. These observations may refer to wintering birds, which would move upriver to slightly higher elevations to breed. It is conceivable the birds along the Nam Kuay Long were defending a territory. The few that probably breed in Nam Ha NPA do not contribute significantly to the national population, which appears to be centered around the central-northern Annamites (Thewlis *et al.* 1998).

Green Cochoa *Cochoa viridis*

World Range: Himalayas to southeast China, across northern Southeast Asia (King *et al.* 1975).
Conservation Status: IUCN Near Threatened

In the Northern Highlands one species was heard in submontane evergreen forest at ca. 1,600 m. above Ban Tonglat Gao in 1997. In the Luang Namtha Plain a singing male was seen in a fruiting tree in secondary hill evergreen forest at 800 m. east of Ban Nam Ya. In the Southern Highlands one was heard on the ridge east of Ban Namvang. Green Cochoa has a highly distinctive song, and it is perhaps surprising the species was not heard more frequently, particularly considering the amount of time spent observers spend in apparently suitable habitat in its favored altitudinal band.

Hill Myna *Gracula religiosa*

World Range: India to south China, throughout Southeast Asia and into Indonesia and the Philippines (King *et al.* 1975). Conservation Status: At Risk in Thailand. It is still widespread and locally common in Lao PDR (Thewlis *et al.* 1998), but since it is a targeted species for the cage-bird trade (e.g. Salter 1993), its numbers are presumably declining.

In 1997 in the Luang Namtha Plain in the Nam Mai floodplain a few were seen in the numerous flowering Erythrina trees just north of Ban Nam Mai. Although not seen, in the Nam Oun-roy Valley, guides report its presence, and the species still persists in good numbers in several other areas. The low numbers seen in Nam Ha may indicate a high demand for trapped birds.

Ashy-throated Warbler *Phylloscopus maculipennis*

World Range: Kashmir to southwest China and northern Southeast Asia (King *et al.* 1975).
Conservation Status: At Risk in Thailand.

In the Northern Highlands several species were seen in montane evergreen forest on the 2,094 m. Peak in 1997. This species is restricted to areas above 1700 m. So far it has been observed at almost every site visited above 1700 m. It faces no immediate threats.

Yellow-vented Warbler *Phylloscopus cantator*

World Range: Himalayas, Burma, northwest Thailand and northern Lao PDR (King *et al.* 1975).
Conservation Status: IUCN Near Threatened

In the Luang Namtha Plain individuals were seen daily in the upper Nam Kuay Long Valley in 1997. This species is thought to winter in Lao PDR; however, several individuals were seen singing which could indicate that they were defending a breeding territory. Birds were also seen to perform short displays for other birds, presumably to initiate breeding. It is possible that this species breeds in Nam Ha and further investigation should be undertaken to verify this.

Rufous-faced Warbler *Abroscopus albogularis*

World Range: Nepal to south China, Hainan, Taiwan and northern Southeast Asia (King *et al.* 1975).
Conservation Status: At Risk in Thailand.

In the Luang Namtha Plain several pairs or small groups were seen in very open, dry secondary growth in the Nam Kuay Long Valley in 1997. This species is widespread in Lao PDR and not an immediate conservation concern.

Rufous-throated Fulvetta *Fulvetta rufogularis*

World Range: Bhutan to southwest China and northern Southeast Asia (King *et al.* 1975).
Conservation Status: IUCN Near Threatened

In the Luang Namtha Plain a flock of at least three individuals was seen moving through dense undergrowth in a stretch of moist evergreen forest in a narrow limestone gorge north of Ban Nam Mai in 1997. More extensive surveys of the middle elevations (600-900 m.) concentrating in damp, shady gullies and ravines in evergreen forest, would probably reveal this species to be more common than this single observation suggests.

Whiskered Yuhina *Yuhina flavicollis*

World Range: Himalayas to western China and northern Southeast Asia (King *et al.* 1975).
Conservation Status: At Risk in Thailand

In the Northern Highlands several groups were seen in 1997 on the 2,094 m. Peak usually busily searching for food in epiphytes in montane evergreen forest. This species is reasonably common above 1700 m. In Lao PDR it faces no immediate threats.

Spot-breasted Parrotbill *Paradoxornis guttaticollis*

World Range: Assam to southern China across northern Southeast Asia (King *et al.* 1975).
Conservation Status: At Risk in Thailand

In the Northern Highlands three birds were seen together in tall grass at 1,400 m. near Ban Kialum and two in similar tall grassland habitat at 1,600 m. in 1997. Four individuals were also seen on the 1300 m. ridge south of the Sing Long District Road in a large field of Imperata grass. In the Southern Highlands one bird was observed on the ridge between Ban Nam Vang and the Nam Kuay Long river valley, in a poppy field at 1300 m. It appears to prefer degraded habitat, and it is not an immediate conservation concern.

Short-tailed Parrotbill *Paradoxornis davidianus*

World Range: Southeast China, eastern Burma, northern Lao PDR and Vietnam (King *et al.* 1975).
Conservation Status • IUCN Near Threatened

In the Luang Namtha Plain two birds were seen, feeding in tall bamboo stands at 720 m., just north of Ban Nam Mai in 1997.

Green-tailed Sunbird *Aethopyga nipalensis*

World Range: Himalayas, western China and northern Southeast Asia (King *et al.* 1975).
Conservation Status: At Risk in Thailand In Lao PDR the species has been regularly found in areas above 1700 m.

In the Northern Highlands one male and two females were seen in 1997 at 1880 m. on the 2,094 m. Peak. It faces no immediate threats.

3. Reptiles and Amphibians

Frogs

A systematic survey of herpetofauna has not been done in Luang Namtha Province. However, three species of frog were caught in 2002 and poor quality photos were taken. Bryan Stuart made identification from e-mailed photos. They were tentatively identified as *Rana livida*, *Rana johnsi* and *Limnonectes sp.*

Big-headed Turtle

Numerous Big-headed Turtles were confiscated at the Luang Namtha market and at the Boten border crossing to China prior to this survey.

Python sp.

A large 'snake track' was seen in one meadow along the Nam Kong in 2002. Villagers report python from all parts of the protected area, but they also report the numbers are very low because they are hunted for the skin trade. A Burmese Python (*Python molurus*) referred to in the area as "rock python" was confiscated from the Luang Namtha market in 2002.

4. Key Species Extirpated from Luang Namtha Province

The following animals have historically had distributions that included Luang Namtha Province, but which are no longer present.

Javan/Sumatran Rhinoceros *Rhinoceros sondaicus/Dicerorhinus sumatrensis*

Conservation Status • Both species are Critically Endangered • CITES Appendix I • Lao PDR Management Category I

There have been no confirmed reports of either species in Lao PDR for a number of years. There is no evidence that either species persists in Nam Ha or Nam Kong. One villager at Ban Samnyot claims to have seen a rhino in 1988, and a track was reported in the same area about 1990. This is the last known record.

Banteng *Bos javanicus*

Participatory biodiversity assessments in the NPA in 1996 (Phiapalath 1996) report the existence of Banteng. However this is principally a lowland species and it is unlikely that this species occurs in the area. The report may have arisen from confusion with the local names of different wild cattle and the fact that this animal once roamed the lowlands of Luang Namtha Province.

Green Peafowl *Pavo muticus*

World Range: Northeast India, southwest China and throughout much of Southeast Asia, with a disjunctive population on Java, Indonesia (King *et al.* 1975). Conservation Status: IUCN Vulnerable • CITES Appendix II • LPDR Management Category I.

In Lao PDR, as in many other countries where it occurs, there has been a serious decline in numbers, largely due to hunting, and habitat loss (Evans and Timmins 1996). It was not recorded during the 1997 or 2002 surveys. Local villagers recognize the species, but they do not know where in the area it is found, if at all. Recent interviews conducted by the Museum National D'Histoire Naturelle in Bokeo Province have had reports of peafowl occurring within the area in the past twenty years (Eric Pasquet pers. comm.). It is very unlikely that the species is still found in Luang Namtha Province, but it is quite probable that it was there in the recent past.

B Wildlife reported as decreasing in abundance (Source: Johnson *et al* 2003)

Animal	Lao PDR risk category	Global threat status	% households (n = 320)
Reticulated Python	PARL		13%
Burmese Python	PARL	GNT	10%
Asiatic Softshell Turtle	PARL	GT-VU	10%
Clouded Leopard	ARL	GT-VU	9%
Asian Golden Cat	LKL	GNT	9%
Tiger	ARL	GT-EN	8%
Smooth-coated Otter	ARL	GT-VU	8%
Pig-tailed Macaque	PARL	GT-VU	8%
Water Monitor	PARL		8%
King Cobra	PARL		8%
Oriental Pied Hornbill			8%
Pangolin	ARL	GNT	7%
Leopard Cat			7%
Hog Badger	LKL		7%
Crested Serpent Eagle			7%
Chinese Pond Heron			6%
Southern Serow	PARL	GT-VU	6%
Indochinese Box Turtle	ARL	GNT	6%
Large Flying Squirrel			6%
Black Giant Squirrel	PARL		6%
Sambar Deer	PARL		5%
East Asian Porcupine	NARL	GT-VU	5%
Bengal Monitor	PARL		5%
Shikra			5%
Mountain Bamboo Partridge			5%
Large Indian Civet			4%
Yellow-legged Buttonquail			4%
Greater Coucal			4%
Masked Palm Civet			4%
Silver Pheasant			3%
Mountain Imperial Pigeon			3%
Grey-peacock Pheasant			3%
Hoary Bamboo Rat			3%
Red Junglefowl			3%
Lesser Oriental Chevrotain			3%
Red Muntjac			3%
Wild Pig			2%
<i>Hoplobatrachus rugulosus</i>			2%
Thick-billed Green Pigeon			2%
Great Barbet			2%
Spangled Drongo			2%
Common Palm Civet			1%
Pallas's Squirrel			1%
Rufous-throated Partridge			1%
Bar-backed Partridge			1%
Red-cheeked Squirrel			<1%
Slow Loris	LKL		<1%
Black-crested Bulbul			<1%
Short-nosed Fruit Bat			<1%
Yellow-throated Marten			<1%
Big-headed Turtle	ARL	DD	<1%
Black/White-cheeked Crested Gibbon	ARL/PARL	GT-EN / DD	0%
Asiatic Black Bear	ARL	GT-VU	0%
Sun Bear	ARL	DD	0%
Gaur	ARL	GT-VU	0%
Source: Johnson <i>et al.</i> 2003			

Lao PDR risk status' (ARL = At Risk in Lao PDR; PARL =Potentially at Risk in Lao PDR; LKL = Little Known in Lao PDR; NARL = Not at Risk in Lao) and 'Global threat status' (GT-EN = Globally Threatened - Endangered; GT-VU = Globally Threatened - Vulnerable; GNT = Globally Near-Threatened; DD = Data Deficient) from Duckworth *et al.* (1999).

