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"Country Environmental Profile of Lao PDR"

Draft Report

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Consortium

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List of abbreviations used in the text

Abbreviation	Organisation or meaning
ADB	Asian Development Bank
AIDS	Acquired immuno-deficiency syndrome
ASEAN	Association of Southeast Asian Nations
BDP	Basin Development Plan
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered species
Cumec	Cubic metre per second
DOTS	Directly observed treatment short course (for tuberculosis)
DPA	District Protected Area
EC	European Commission
EIA	Environmental Impact Assessment
EdL	Electricite de Lao
EMMU	Environmental Management & Monitoring Units
EP	Environmental Programme
EPI	Expanded Program of Immunisation
FAO	Food and Agricultural Organization of the United Nations
FINNIDA	Finnish International Development Agency
FLEGT	Forest Law Enforcement Governance & Trade
FORCOM	Forest Management and Community Support Project
GDP	Gross domestic product
GMS	Greater Mekong Sub-region
GOL	Government of Lao PDR
HIV	Human immuno-deficiency virus
IDA	International Development Agency
IUCN	International Union for the Conservation of Nature
JICA	Japan International Co-operation Agency
LMB	Lower Mekong Basin
MAF	Ministry of Agriculture and Forestry
MCTPC	Ministry of Communication, Transport and Post and Construction
MDG	Millennium Development Goals
MOU	Memorandum of Understanding
MRC	Mekong River Commission
MW	megawatt (unit of electrical power generating capacity)
NBCA	National Biodiversity Conservation Areas
NEC	National Environment Committee
NGO	Non-Governmental Organisation

NPA	National Protected Areas
NTFP	Non-timber forest product
NWFP	Non-Wood Forest Marketing Project
OECD	Organisation for Economic Co-operation and Development
PA	Protected Area
PDR	People's Democratic Republic
PM	Prime Minister
PRONAM	Provincial Natural Resources Management Project (Lao-Swedish initiative)
RAMSAR	Wetlands of International Importance Especially as Waterfowl Habitat
SEA	Strategic Environmental Assessment
SEF	Asian Development Bank Strategic Environmental Framework in the Greater Mekong Sub region
SIDA	Swedish International Development Agency
STEA	Science, Technology and Environment Agency
SUFORD	Sustainable Forestry Rural Development Project
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFPA	United Nations Family Planning Association
UNICEF	United Nations Children's Fund
UXO	Unexploded ordonance
WB	World Bank
WHO	World Health Organisation
WRCC	Water Resources Co-ordinating Committee
WSSD	World Summit on Sustainable Development
WUP	Water Utilisation Plan
WWF	Global Conservation Organisation (formerly known as the World Wildlife Fund)

1. Executive Summary

1.1 Administrative issues in environmental management

1. Natural resources are the foundation of Lao PDR's wealth, with over 80% of the population dependent on access to them for their daily subsistence. On this basis alone, environmental issues should be mainstreamed into strategic planning for EC involvement in the country's development.
2. Biological resources are being depleted at an increasing rate by plundering essentially sustainable resources by individuals interested only in one-time commercial gains. This involves both private sector entrepreneurs and public sector administrators, police and army personnel. The process is now out of control.
3. The legislative framework on which environmental management is based is adequate. However, the critical defect in achieving effective regulation and bringing this over-exploitation under control is the fundamental weakness of the national regulatory authority, the Science, Technology and Environment Agency (STEA). It is under-resourced and incapable of exerting any effective regulatory function in the field of environmental protection.
4. STEA is nominally responsible for assessing environmental impacts of development proposals. In fact it has neither the expertise nor the manpower to do so. Project proponents are able to provide incomplete or deliberately biased Environmental Impact Assessments (EIAs) that are obscure or fail to deal with significant issues that are crucial to the protection of the environment. Some Ministry Departments have taken on the role of preparing and assessing EIAs, but the quality of such work lacks uniformity and there is no capacity for quality control.
5. In the immediate future, strengthening the capacity of STEA to enforce environmental regulations will not prove effective without solid support from Government at the highest level. Even then, since there is illicit involvement of the nominally relevant enforcement agencies in this resource plundering, an alternative approach to development project preparation and implementation is needed to prevent subversion of objectives and funds.
6. Alternative compliance strategies need to be identified and built in to new policies and projects. They must include strictly applied conditionalities, requiring all interested parties to meet stringent performance targets.
7. Strategic planning for future EC involvement must be founded on a comprehensive policy of placing compliance enforcement at the centre of all projects and programmes. Personal responsibilities, liabilities, incentives and deterrents need to be at the centre of all development programmes; without these there is unlikely to be any strengthening of the capacity to regulate and bring under control the existing depredation of the natural resource base of the country.

1.2 Sectoral issues.

8. Despite their critical importance, environmental resources are being depleted at an astonishing rate. The forest cover on which the stability of the physical environment is dependent has decreased from 47% to only 34% in the past fifteen years, despite an official ban on the removal of timber.
9. Forest resources are under severe threat from illegal logging, inappropriate 'concessions' (often no more than thinly disguised money-laundering operations) and from cross-border trading in wildlife commodities.
10. Apart from logging activities, the Government views the central cause of environmental damage in the highland areas as swidden ('slash-and-burn) agriculture, and has a policy of eliminating the practice. This is ill-founded; apart from the human rights issues raised by this policy, sustainable swidden is an essential component of the bio-dynamics of the forests. It increases biodiversity.
11. Removing communities from Protected Areas and watersheds converts them into Unprotected Areas, vulnerable to cross-border incursion and uncontrolled resource stripping.
12. Recent large-scale incursions by Chinese settlers in the Northern Highlands is a particularly alarming process. Environmental concerns are ignored and extensive use of inappropriate agricultural practices exacerbates the already serious environmental consequences of increasing population pressures in this region.
13. Protected Areas along the Laos/Viet Nam border are under threat from new cross-basin highways and the enlargement of the Ho Chi Minh Highway running through or close to a number of important Protected Areas. In the absence of effective protection capacity, the resources of these PAs are now in considerable danger.
14. Fishery resources form up to 80% of total protein intake for many communities, yet hydropower schemes can have devastating effects on both the absolute availability of fish both downstream and upstream and on the number of species present. Expansion in this sector presents a classic conflict of interest that must be resolved by far greater awareness of the importance of environmental externalities and sectoral conflicts of interest than has so far been evident.
15. Within the Mekong Basin as a whole, the implications of sectoral development policies and priorities need to be far better analysed than previously. Exported and cumulative impacts may be exerted not only downstream, but also upstream; all riparians are vulnerable to environmental and social changes within the Basin ecosystem as a whole.
16. In the urban environment, migration of active bread-winners to large centres is increasing, weakening family ties and putting vulnerable individuals – particularly the elderly and the mentally disabled – at a disadvantage. Particular emphasis is needed to discover the effects of this process and to devise ways in which support can be provided to these groups.

17. The increase in tourism has brought a degree of prosperity to some sectors of the urban community, notably the catering and accommodation sectors. However, it has been accompanied by a marked growth in the commercial sex trade that is ill-served by the inadequate medical services. With increased mobility of rural in-migrants, the prospect of a rapid spread and escalation in sexually transmitted diseases to even isolated rural communities is a real threat, and emphasis on dealing with this problem needs to be made now, before it becomes impossible to contain.

2. State of the environment

2.1 Physical environment and resources

2.1.1 Location

Laos lies within the geographically distinct Mekong Basin, and shares riparian interests with China, Myanmar, Thailand, Cambodia and Vietnam. The country lies mainly on the eastern (left) bank of the Mekong, with a small area in the Northwest on the right bank. In environmental terms, the country is intimately linked with its neighbours, and in dealing with environmental issues within Laos it is essential to be aware of the complex environmental and social interactions between all six riparian states, both in the past and today.

2.1.2 Landform

The primary landform of the Basin is the result of tectonic interaction between the Indian plate and the Asian continent, resulting in the uplift and complex folding of the northern and eastern boundaries of the Basin. The present-day Mekong is not an ancient river. A series of river captures and amalgamations in the upper region of the Basin, coupled with changes in the elevation of the Khorat Plateau in the central region and movements of the Cambodian Plain, have contributed to the present-day highly complex configuration of the Basin. This dynamic development of the topography of the Basin and its drainage is an important factor in the development of the very high biodiversity of the region.

The Northern Highlands extend through Myanmar, northern Thailand, Yunnan Prefecture in China, and the northern parts of Laos and Viet Nam. The terrain is rugged with elevations between 500 and 2000m. More than half of the area has slopes exceeding 50%, and less than 20% has a slope of less than 20%. The climate is relatively wet subtropical, with rainfall averaging up to 2000mm/year. The acidic soils are well-drained, leached and of relatively low fertility.

A southern extension forms the Annamite Chain, along which runs the main part of the boundary between Laos and Viet Nam. The landform is at the same elevation as the Northern Highlands but less precipitous, with similar soils, and has a tropical monsoon climate with rainfall of 2500-3000mm/year.

Along the western side of the country the Mekong Floodplain and lowlands extend down to the Cambodian border and up the lower parts of large tributaries such as the Xe Kong and Se San. The zone is subject to seasonal flooding, and contains some of the most important permanent wetlands in the country. The climate is tropical monsoon, but there is a generally lower rainfall than the highland areas. The shallow acid alluvial soils are fertile, and support a large part of Laos' agricultural sector.

2.1.3 Geology

The geological fault at which the Khone Falls are located marks the effective the boundary between the Middle and Lower Basin. The geology of Laos includes considerable areas of karst (limestone) with sandstones, granites and intrusive volcanic basalts. Rapid erosion caused by the region's high rainfall has resulted in further dissection of the highlands and the development of restricted sedimentary depositions in depressions and along the Mekong Basin. Extensive sedimentary deposits occur along the Se Kong and Se San sub-basins, on the eastern side of the main river, draining a large part of the southern end of the Annam mountains.

2.1.4 Mineral resources and mining

2.1.4.1 Historic mineral resources

The mineral resources of the country have recently been recognised as an important potential growth sector. In 2000, barytes, coal, construction aggregates, gemstones, gold, gypsum, limestone, rock salt, sand and gravel, and tin were produced for domestic consumption and export. Limestone and gypsum are processed into cement and building boards. With the exception of gypsum and tin, most of the mineral production was small, and the output of the mining and quarrying sector in 1998 accounted for 0.42% of the country's GDP.[1]

Gypsum is produced from the Dong Hene Mine in Savannakhet Province by the State Gypsum Mining Enterprise. Production has increased considerably recently due to increased demand by the Vietnamese cement industry. The State Tin Mining Enterprise produces tin from the Nam Pathene Valley in Khammouan Province, all of which is exported. Anthracite coal is produced by the State Coal Mining Enterprise (SCME) from the Chakeui Mine in Salavan Province, whilst the Hongsa Mine in Sayaboury Province, and the Muong Ngeum Mine in Louangnamtha Province yield lignite (brown coal).

Most of the coal is used by the cement plant at Vang Vieng in Vientiane Province, which has a capacity of 73,000 metric tons per year. A second cement plant has been built at Vang Vieng with a capacity of 200,000 t/yr, and is a joint venture of the Agricultural and Forestry Development and Services Company of Laos (40%) and Yunnan International Economic-Technical Cooperation Company of China (60%). The SCME also produce barite from the Na Ang (Nalang) Mines in the Muong Feuang Valley in Vientiane Province, whilst sapphire is produced by the State Sapphire Mining Enterprise at Ban Houei Xai in Bokeo Province.

2.1.4.2 New developments – large-scale gold and copper mining

Recent developments in mining gold and copper are giving cause for concern in both the environmental and the social sectors. The Xepon project is located in Savannakhet province

[1] U.S. Geological Survey Minerals Yearbook 2000 8.2

in south central Laos, and is being developed by the Australian company Oxiana Resources, in partnership with Rio Tinto and the World Bank. The project development area covers 1947 km2 and contains an estimated 3.5 million ounces of gold, 9 million ounces of silver, and one million tonnes of copper. Under Phase 1 the development of the gold resources and associated infrastructure are being developed to produce up to 150,000 oz of gold. It poured its first gold in late December 2002. In Phase 2 the copper resources and associated infrastructure are being developed, and the first copper production was expected early this year. Oxiana Resources estimate that the mine could produce 40,000 t/yr of cathode grade copper by using the solvent extraction-electrowinning process, and 3,732 kilograms per year of gold for 14 years. The copper resources of the main deposit have been estimated to be 41.1 million metric tonnes (Mt) containing 2.4% copper, and more than 99,531 kg of gold[2].

2.1.5 Water - Rainfall and runoff

The Southwest Monsoon between April and October is responsible for up to 90% of the annual rainfall. Mean annual rainfall varies from a low of under 1500mm/year in the lowlands and over most of the Northern Highlands to greater than 3500mm/year on the Bolovens Plateau.

The Mekong rises in Qinghai Prefecture in China, at an elevation of around 5000m. Downstream of the Chinese border it collects runoff from Myanmar, Thailand and Laos in the sections generally designated as the middle basin. Below the Khone Falls it is fed by the large tributaries of southern Laos and Cambodia, notably the Se Kong, Se San and Sre Pok on the left bank (eastern side) and the drainage from the Cambodian Floodplain and the Tonle Sap area of Cambodia on the right bank.

	Country or Province						
	Yunnan PRC	Myanmar	Lao PDR	Thai land	Cam bodia	Viet Nam	Mekong Basin
Catchment area as % of Basin	22	3	25	23	19	8	100
Average flow from area (m3/sec)	2410	300	5270	2560	2860	1660	15,060
Average flow as % of total	16	2	35	18	18	11	100
Specific runoff rate (Average flow / catchment area %age)	109	100	211	111	150	207	150

Table 2.1 National contributions to Mekong runoff[3]

[2] Asian Journal of Mining, 2000, p. 13-14

[3] Based on data provided in State of the Basin Report 2003 (Chapter 3). MRC Vientiane)

The contributions of individual States to the total Mekong Basin runoff are shown in Table 2.1 The average runoff rate for the Basin as a whole is 150 cumecs for each percentage of the basin area; on this basis Laos has the highest specific runoff rate of all of the riparians, as well as the greatest absolute contribution (35% of the total). The potential for sediment mobilisation is therefore high – equally, sedimentation rates in impoundments are also likely to be relatively high, leading to reduced economic lifespans for developments such as dams and reservoirs.

2.1.5.1 Flood season discharges

Flood flows have relatively low variability compared to most Asian rivers of comparable size, so when exceptional floods do occur in the Mekong, they are not very much larger than the normal average flood. Flood peaks occur in August in the upper Mekong and September in the lower basin.

2.1.5.2 Causes of flooding

According to the MRC, in Laos the combined effects of large flows in the tributaries and high water levels in the mainstream channel of the Mekong combine to back up water in the tributaries, resulting in localised flash flooding on tributaries and over-bank flows in low-lying areas and along the Mekong River. 80% percent of rural flooding and 20% of urban flooding is caused by this effect - all of the four major flood prone areas in Lao PDR are situated along the mainstream near large tributaries. These are Vientiane Plain, Khammoune Province (Thakhek town), Savannakhet Province and Champasak Province (Pakxe town).[4] The cause of flood flows is prolonged heavy rain on saturated soils, but a number of other factors may be involved. These include:

- Climate change.
- Deforestation and land clearance.
- Land degradation.
- Changes in flood storage capacity.
- Reclamation of floodplains and wetlands.
- Expansion of urban areas
- Channel migration and other man-made modifications to river channels:
- Reservoir operation

2.1.5.3 Flood role of the Cambodian floodplain

The Tonle Sap Great Lake and floodplain around Phnom Penh act as a flood buffer within the lower basin, where a substantial part of the Mekong flood is diverted into the Great Lake from mid-May to August, and drains back to the delta from October and into the dry

[4] MRC, 2001. MRC Strategy on Flood Management and Mitigation. Mekong River Commission, Phnom Penh.

season. Impacts of climate change and river impoundments in the upstream part of the basin, especially Laos and Yunnan, on the flow regimes in the Tonle Sap system could have serious implications to fisheries in Laos. Equally, changes in the flood regime or buffering capacity may affect fishery recruitment and production upstream in LaosRecent changes in flood discharges

Over the past few decades there has been a significant trend in the lower and middle basin towards increased discharges during the dry season and reduced discharges during the wet season. This trend is not associated with changes in the rainfall, as no significant changes have been observed. Nor is it associated with the development of any single large storage reservoir, such as Nam Ngum. The most likely cause appears to be the increase in water control structures developed in the basin, including the widespread growth of irrigation, particularly on the relatively dry Khorat Plateau in Thailand.

2.1.6 Potential effects of climate change

Uncertainties inherent in climate change modelling dictate that scenarios postulating both depletion and enhancement of rainfall need to be considered in estimating the putative risks arising from future climate change. Increased sea temperatures in the South China Sea may increase the risk of typhoon-induced sea surges, but these are irrelevant to this assessment. Increased rainfall would lead to an increase in run-off, but as previously mentioned, the Mekong shows remarkably little response to periods of unusually high rainfall, and flood risks in Laos would be mainly from overflows from swollen tributaries rather that back up of these against an unusually high Mekong River. If however rainfall decreases, then flood risks would become less severe in those areas currently affected.

2.1.7 Sectoral impacts on physical conditions.

The most significant effects on the physical environment are likely to occur as a result of deforestation and the development of hydropower. Excessive land clearance on sloping ground has increased soil erosion and sediment transport in some tributaries of the Mekong. Conversely, hydropower dams trap large quantities of sediment, discharging water that has lower suspended solids loadings than before the dam was constructed.

Peak discharges below such dams may be lower than in the formerly unregulated river downstream, but in some cases they are actually far greater (as in discharges from Nam Theun 2 to the Xe Bang Fai River).

New schemes lead to complex changes in the erosion characteristics of the discharges below the dams, and in turn affect the main Mekong flows with lower average wet season discharges and higher dry season discharges. The new dams in Yunnan already marginally affect the water quality and seasonal discharges in the Mekong in the upper parts of the

Laos stretch of the river. The far greater future planned expansion of Chinese dam storage capacity, especially those coming on-stream in 2010-2014 – will impact Mekong flows in Laos much more. Cumulative impacts of hydropower development in the tributaries feeding the Mekong from Yunnan, Laos, Thailand and north-eastern Cambodia as a result of future expansion generating capacity are liable to have significant effects for all riparians apart from China.

2.2 Biological resources

2.2.1 Over-view - Primary resource systems under threat.

Laos contains a unique biota (plants, fungi, animals etc) that is critical to the subsistence of around 85% of the human population. Despite its absolute relevance to the maintenance of both sustainable ecosystems and the welfare of its peoples, failure to place the environment and its biological resources at the centre of strategic planning constitutes the greatest threat to the future stability of the country both in terms of the preservation of the ecosystems as a resource base and in terms of future political stability. Incursions into the country, particularly from the north, represent a real and increasing source of tension between indigenous peoples already severely affected by adverse trends in population pressure and cross-border resource depredation and trade. The additional challenges posed by recent uncontrolled Chinese colonisation of the Northern Highlands represent a significant escalation on pressures on natural resources that needs to be addressed immediately. Without full control of this new threat, the rate of loss of forest land, already far higher than has officially been accepted, and the associated pressures on biological resource availability and biodiversity can only increase further.
Crucial defects in the application of environmental management and enforcement of legislation designed to protect the environment are capable of leading to a dramatic failure in the sustainability of the natural and man-modified ecosystems that presently exist in the country, In the wider context, external changes in the dynamics of the main river system, causing changes in river characteristics, are already leading to changes throughout the entire basin that could, in the long run, lead to critical conflicts of interest between riparians, and a loss of political stability.

2.2.2 The biological resource base - ecosystems and habitats of international importance.

The following analysis provides an indication of the scale and role of biological resources within the country, as well as an indication of the impacts of recent large-scale developments both within Laos and within the wider context of the Mekong Basin itself.
The following biogeographical zones are recognised within Laos:

• ***Northern Highlands.*** The northern mountains differ from the Annamites in the central and southern part of the country, with different species assemblages.
• ***Evergreen Forests of the Annamite Mountains and Foothills.*** The most biologically distinct ecosystem. It includes extremely wet forests, and there are many endemic species. The Lao Annamite forests are probably of highest quality in Lao PDR, due in part to lower human pressure.
• ***Bolovens Plateau.*** This massif lies between the Mekong and the Annamites, and is a habitat of unique importance.
• ***Central Indochina Limestone Karst*** The distinctive karst landscape occurs only in Laos and Viet Nam. There are many endemic species.
• ***Dry Dipterocarp Forests of the Mekong Plain.*** This habitat occurs mainly in the south. The area is generally low-lying with many pools, and has an open forest structure dominated by deciduous Dipterocarp trees and grassland. The zone is very important for a variety of wildlife and water birds.
Mekong River Laos contributes 35% of the total Mekong flows, and the integrity of its rivers and tributaries are vital to the stability of the river ecosystem. Primarily important internationally through its extraordinarily diverse fish species
• ***Other rivers and streams streams.*** Because of the extensive mountainous topography of Lao PDR, streams are a widespread and key habitat. The fish diversity in streams of Lao PDR is very high, and so is endemism.

2.2.3 Zones of ecological importance

2.2.3.1 The Highland Zone

The Annamite mountain chain dividing Lao PDR and Vietnam is a rugged and generally densely forested mountain area, with a westward outlier, the Bolovens Plateau. The upper watershed of the basins include areas of Montane evergreen and mixed coniferous forests. The tropical lowland plain area is mostly low hills and lowlands with many permanent and temporary wetlands of great ecological importance. In some locations of the Eastern Highlands the former widespread use of defoliants has left a permanent impact on the local ecology.
In upland areas typical cropping and land use are based on swidden agriculture. Significant crops are upland (dry) rice, maize, banana, cassava and vegetables, supplemented by the collection of non-timber forest food, medicinal and cultural products (NTFPs). Many settlements are located in or near valleys, close to a reliable source of water, and low slope land where cultivation is easier. In most valleys flood recession agriculture is practised and includes short season cassava, maize and vegetables.

On the lowland plain some of the original Dipterocarp and mixed forest has been cleared and parts of the area are now extensively cultivated, but human population densities remain comparatively low.

2.2.3.2 The Mekong Plains and Lowlands

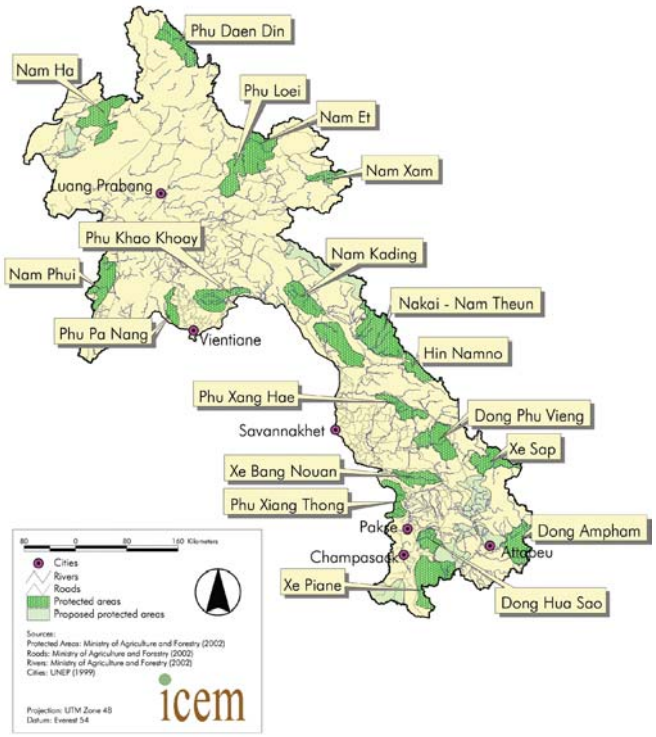
The Mekong Lowlands extend along much of the the left bank of the Mekong downstream of Vientiane, as well as much of the Se Kong-Se San basin. Within this zone the Khone Falls is an important ecological site of great bio-geographical significance as it forms a natural boundary between the Lower and Middle Mekong river. This zone is highly vulnerable to hydrological and ecological changes caused by upstream hydropower interventions, and the need to prevent the exceedance of critical environmental limits could affect the acceptability of upstream developments under a basin-wide management programme.

Human settlement is more intense, and the ecosystem has been very considerably modified, or even almost eliminated altogether in urban centres and agricultural zones. The main exception is the wetlands of the southern part of the country, especially in the Xe Kong valley, where natural ecosystems founded on waterlogged soils and frequent wet season flooding provide important wildlife refuges.

A number of `biodiversity hot-spots' have been identified in the Mekong Basin. One is the border triangle between southern Lao PDR, Northeast Cambodia, and Viet Nam, in which some of the rarest and most precious species still exist. All of the six hydropower sites considered in the Halcrow hydropower study fell more or less into this triangle, revealing the high degree of vulnerability to development in this region of Laos.

2.2.3.3 Protected Areas

National Biodiversity Conservation Areas



National Protected Area	Extent (ha)
Nam Dene Dinh	222,000
Nam Ha	222,400
Nam Et	170,000
Phou Loeuy	150,000
Nam Xam	70,000
Nam Phoui	191,200
Phou Pa Nang	70,000
Phou Khao Khoay	200,000
Nam Kading	169,000
Phou Hin Poun	150,000
Nakai Nam Theun	353,200
Hin Nam No	82,000
Phou Xang He	109,900
Dong Phou Vieng	197,000
Xe Sap	133,500
Xe Bang Nouan	150,000
Dong Hua Sao	110,000
Phou Xieng Thong	120,000
Xe Pian	240,000
Dong Am Pham	200,000

Fig. 2.2.1 National Protected Areas of Lao PDR

No formally designated National Parks (in the international context) have been implemented although there is provision for this in the NPA Regulations 2001. National Protected Areas (NPAs – also known as National Biodiversity Conservation Areas – NBCAs) are a relatively new developments in Laos. The first 18 were established in 1993, and two more in 1195 and 1996. Most correspond most closely to IUCN Category IV Protected Areas – Managed resource Areas.

Other Protected Areas

In addition to the NPAs, there are many smaller areas that have been designated as Protected Areas. These include Provincial PAs, District PAs, Protected Watershed Areas, Provincial Conservation Forests, etc. None have protection under national legislation, and even Provincial PAs have somewhat uncertain local legislative protection. None have received any significant development assistance, and Donors generally ignore them in favour of NPAS. DPAs have no legal status, and are generally set up by local people for specific purposes. Although a few have been formally set up, a more common and

widespread form of DPA is the Fish and Frog Conservation Zones, which was originated by a groups of villages in Champassak but are now found in many parts of the country.

Protected Forests

In 1996 the Forestry Law defined five types of forest. In 1996 the Forestry Law defined five types of forest:

Protection Forests are set aside for watershed management, erosion control, national security and prevention of natural disasters, and are mainly poorly defined unmanaged steep woodland on very steep terrain.

Conservation forests are, areas set aside for scientific, historical or touristic purposes, and may be identified at all levels from village to national. This type of forest has three sub-classifications; Absolutely Prohibited Zones, Management Zones nominally available to 'the people' for limited resource extraction, and Linking Zones for the enhancement of conservation where no damaging activities are permitted**.**

Production Forests. These are forests set aside for commercial production of timber-derived products. They include plantations that may replace natural forest land, and in some cases may be established in former forest areas as an alternative cash crop.

Regeneration and Degraded Forests are areas of forest that are being allowed to recover from prior logging or other clearances, or which are simply in an impoverished state with little short-term prospect of returning to their natural or commercial state.

2.2.4 Biodiversity

The rural areas of Laos support approximately 85% of the human population, yet the natural biodiversity remains extremely high throughout the entire region. A total of 319 of the species recorded for Laos are of national or global conservation significance, specifically 67 percent of the large mammals, 53 percent of the bats, 6 percent of the insectivores, 14 percent of the rodents, 22 percent of the birds, 25 percent of the reptiles and 2 percent of the amphibians.

Group	Lao PDR	Cambodia	Myanmar	Thailand	Viet Nam	Yunnan
Mammals - total	157	117	300	282	275	255
Mammals - endemic	1	1	6	8	5	n/a
Birds - total	609	545	1000	930	744	766
Birds - endemic	3	0	3	2	4	n/a
Freshwater fish	n/a	850	n/a	650	n/a	n/a
Amphibians - total	37	28	75	107	80	n/a
Amphibians - endemic	n/a	n/a	n/a	13	n/a	n/a
Reptiles - total	66	82	360	298	180	n/a
Reptiles - endemic	n/a	n/a	n/a	31	n/a	n/a
Swallowtail butterflies	39	22	68	56	37	n/a
Insects	n/a	n/a	n/a	n/a	6000	n/a
Vascular plants	8290	7570	7000	15000	12000	18000
Endemic plants	1457	1175	1071	2742	4800	n/a
Ferns	n/a	n/a	n/a	600	800	n/a
Fungi	n/a	n/a	n/a	3000	600	n/a

Source MRC/UNEP 1997) (n/a – no available data)

Table 2. 1. Comparison of Biodiversity in Mekong Basin Countries

Biodiversity and human settlement

The high level of biodiversity is in great part due to both its geological variability and to its history of tectonic folding and associated successive river capture. Human use, especially upland agriculture in the Highlands, has in many areas opened the original more or less closed canopy forest, introducing small temporary patches of cleared ground which provide a new habitat for species that otherwise would find it difficult to colonise the unbroken forest cover.

The isolation of the highland forests provides a refuge for many land animals, including endemic species that have only recently been recognised. On occasions these turn up as bushmeat in remote village markets, underlying the importance of wild animals in the diet of mountain communities, and the need for a far better understanding of the ecology of these forests if effective biodiversity management is to be an achievable planning objective.

Human occupation as a factor in maintaining biodiversity.

Ethnic and cultural diversity is extremely wide in Laos, and it is essential to recognise that human groups and their cultures are essential elements of biodiversity. Yet the degree to which the biodiversity of disturbed forests is affected by human presence, forestry and shifting cultivation remains unclear. Hunting is a perpetual occupation in many mountain villages, yet recent discoveries of new large mammals on the Laos-Viet Nam border in the Annam Range have all been in areas which have at least some human settlement.

It is essential to bear in mind that the present forest ecosystems are entirely the result of long interaction between the human inhabitants and the rest of the animals and plants that make up the biological communities in Laos. For example, by breaking the umbrella of continuous tree cover through swidden agriculture, the range and extent of available habitats is actually increased, and more species – both animal and plant –are able to establish viable populations. The number of tree species in secondary regrowth may often be greater than was present before the land was cleared temporarily, and swidden farmers may deliberately cultivate or encourage the growth of eighty species of more of wild plants that they use for subsistence, medicinal and cultural purposes.

Provided that an appropriate balance is maintained between human activities and the dynamics of the forest ecosystem, the stability of the ecosystem is not threatened by human presence. Indeed, when indigenous peoples are moved out of official Protected Areas these centres of biodiversity become effectively Unprotected Areas, vulnerable to incursants and non-indigenous exploiters with no vested interest in preserving their biodiversity

Government policy on forest occupancy appears not to appreciate the fundamental relationship between man and nature. Consequently here are increasing adverse pressures on forest-living indigenous peoples from misdirected Government policies that will inevitably deplete the viability of many communities and their cultures in the future unless adequate provisions are made to protect them.

Local effect of shifting cultivation on climate

Swidden can also increase rainfall locally, by allowing better air circulation under the canopy. In Costa Rica the economic effects of a minor increase in sediment transport in streams draining swidden areas and increasing reservoir siltation rates is less than ten percent of the added value of the increased generating capacity caused by the increase in rainfall and run-off. Human habitation, when not excessive, therefore supports biodiversity and economic interests.

2.2.5 Forestry: The state of forest resources in Laos

2.2.5.1 Economic value of forests.

Laos is fairly well endowed with valuable, productive and ecologically unique forest in comparison with its neighbouring countries of Thailand and Vietnam. They are a vital

economic resource, which provides an essential contribution to the consumption and income of the rural population, and particularly the rural poor. Eighty percent of the population relies heavily on the forest for timber, food, fuel, medicines and spiritual protection. In rural areas, forests provide one of the few available economic activities, and in forest rich areas non-timber products contribute more than half of family income.

Forests contribute 3.2 % of GDP[5] by log production and its share would be higher if the use and processing of wood and NTFP were counted. Wood products also contribute some 25 percent of total export earnings[6] and log royalties make substantial contribution to government revenue. At the same time, they are habitat for the nation's rich natural biodiversity, and protect its soils, watersheds, and water resources.

2.2.5.2 Destruction of forests

Of the total national area, forests with more than 20% crown cover occupied some 40 percent in 2002 down from some 47% in 1992. Direct causes for the loss are forest clearing and burning by unsustainable shifting cultivation, uncontrolled logging and conversion to agriculture and other land uses with the underlying causes of wide spread poverty, rapid population increase and weak law enforcement. Forest change, which encompasses decreases in stocking and size of trees and loss of wildlife and plant habitats, is also a serious problem in addition to the physical deforestation.

There is growing concern that rampant deforestation will have adverse social, economic, and environmental impacts. Moreover, deforestation and forest degradation affects most severely the poorest segments of the population, and particularly women and ethnic groups whose livelihood depends on the health of the national forest resources. Indeed, illegal logging, which appears extensive in Cambodia and Lao PDR, presents a greater environmental concern in terms of sustainability and deforestation, although again, it is difficult to ascertain the quantities of timber involved.

There are particular problems with concession operators adjacent to protected areas logging within the protected areas and merging the illegally-acquired logs with their legitimate harvest to avoid detection. Furthermore, the concession granting process is often not transparent and enforcement is weak, leading to over-cutting of valuable trees at an unsustainable rate. The enforcement of regulation and implementation of policy is made difficult by a lack of resources for forestry agencies. A comparison of forest cover in the lower Mekong basin is shown in the table below;

2.2.5.3 Reafforestation targets

Recognising the rapidly deteriorating forest resource situation and changing socio-economic conditions the Government of Lao PDR (GOL) organized the 1st National Conference on Forest in 1989, which called for establishment of a comprehensive forestry legal system,

[5] Statistical Year Book 2003, National Statistical Centre
[6] Economic and Monetary Statistics, September 2002, Bank of the Lao PDR

urgent actions for ecosystem/wildlife conservation and strengthening of forest institutions and human resource development. More recently the 7th Party Congress in 2001 set the development targets for 2005, 2010 and 2020, which were subsequently endorsed by the National Assembly.

Country	1993	1997
Cambodia	59	58
Laos	42	41
Thailand	16	15
Vietnam	24	24
Lower Mekong Basin	36	35

Source: State of the Basin, MRC, 2003

Table 2.2.2 Forest Cover in the Lower Mekong Basin (% in 1993 and 1997)

These targets included stabilising shifting cultivation by 2005 and phasing it out completely by 2010. Tree plantations for commodity production are to be strongly promoted, and acceleration of classification, delineation and management of forests for protection, conservation and production was also called for. Maintenance of a healthy and productive forest cover is integral to the rural livelihood support system.

2.2.5.4 Forest sector legal framework

GOL has taken a series of actions to realize these resolutions and objectives as follows;

Establishment of NBCAs.

PM Decree in 1993 established 18 National Conservation Forests and National Biodiversity Conservation Areas and addition of two others selected on cultural grouynds, and expansion were made in later years. These NBCAs now cover more than 12% of the total land area.

Development of the legal framework.

The legal framework has been strengthened including by promulgation of the Forestry Law and related laws, and issuance of implementing regulations. Several Prime Minister's Orders and Decrees now control harvesting and sales of forest products. The Government has sharply reduced the annual harvest of logs from a peak of 734,000 m3 in 1999 to some 270,000 m3 in 2003/04 and further to some 150,000 m3 in 2004/05.

Land and forest allocation.

The land and forest allocation programme, aimed at cash crop production, stabilising shifting cultivation, and forest conservation, was formally introduced in 1996, and more than a half of the total villages are now allocated land for farming and tree planting and forest management. Over the last ten years there has been a noteworthy reduction in the

area under shifting cultivation.

Tree planting programme.

Tree planting has increased more than 10 fold from around 500 ha/year in early 1990s to around 17,000 ha/year in 2000. Tree species planted by farmers are Teak and Rosewood and some exotic fast growing species. Many nurseries have been established by both private and public sectors and harvesting and processing of planted trees, mainly Teak, has been started and bringing benefits to farmers and contributing to employment and conservation of natural forests.

Research and extension.

The National Agriculture and Forestry Research Institute and the National Agriculture and Forestry Extension Service established in 1999 and 2001 respectively have started to provide co-ordinated and field oriented research and extension services contributing to development of alternatives to shifting cultivation.

2.2.5.5 Shortfalls in achieving forest stability

In spite of these efforts and achievements, the sector management remains weak and forest resources are not used efficiently and sustainably, leading to an accelerated reduction.

Management of NBCAs is still at an initial stage. Many of them lack clear boundaries and management plans and resource depletion continues. Illegal harvesting and trade of wildlife and NTFPs is also likely widespread. Operational capacity of saw mills is still far above the harvesting levels set by the Government and continues to put pressure on natural forests.

Growth and quality of planted trees are very low compared with international standards. Maintenance of young stands is insufficient and thinning, which is essential for quality wood production, is rarely done, especially in small stands established by farmers. Market survey for planted trees has not been well done in selection of sites and species for planting.

Various laws and regulations are not well understood by local people as well as local officers and other stakeholders, thus their enforcement is weak. In general, institutional and human capacity in the forestry sector are still developing and lack of adequate funds and facilities exacerbate the sector performance. For example, the land and forest allocation exercise has been done in a hastily way without participation of other sectors concerned and sufficient training of concerned officers and villagers. Contrary to its aims there are cases that villagers are not benefited from this exercise mainly due to limited communication with and support from local authorities.

2.2.6 Agriculture

2.2.6.1 The importance of agriculture

Agriculture is the single most import economic activity in Laos. Over 80 percent of the population are subsistence farmers who rely upon farming for their livelihood. According to the Lao PDR Ministry of Agriculture and Forestry 2000, agriculture contributed 36.7 percent of GDP in 1990 and this figure reduced to 28.7 in 1990. The principal crop is rice, followed by maize and beans and peanuts. Rubber, coffee and sugar crops are being increasingly grown in border areas by Chinese and Thai investors. Some of these crops are being cultivated on inappropriate sites with little regard for environment or long term sustainability.

Estimates of arable land in Lao PDR vary, but there are indications that such land is not currently fully utilised, leaving room for extended cultivation in the future. The MRC Land-Use data give an agricultural land area of 2.9 million ha, but government statistics record only approximately 800,000 ha under active cultivation. Over 400,000 ha is cultivated on slopes greater than 20 percent, which is not conducive to the growing of annual crops under current cultivation systems and makes erosion and other forms of environmental degradation more likely.

Conceptually, Lao PDR can be divided into two distinct categories of land area which support dual agricultural economies. The first is the relatively flat and fertile land of the Mekong Corridor. This area is predominantly used for rice production and has recently undergone rapid market-driven economic transition, whereby farmers increasingly buy agricultural inputs through commercial channels and market a proportion of their produce. The second area consists of sloping lands that are less suitable for rice cultivation. These remote areas are characterised by subsistence agriculture and a lack of access to markets and technologies. Population pressure and inherent ecological vulnerabilities are leading to environmental degradation. These remote areas, especially those in the northeast, face problems with unexploded ordinance.

2.2.6.2 Agricultural systems

Shifting cultivation provides a means of producing foodstuffs for subsistence on steep and rugged terrain, unsuited to permanent cultivation. It is sustainable, however, only at low population densities and it persists at the expense of timber production. Smallholder-based mixed farming is the most productive in terms of overall yield of consumable product, but presents problems in ensuring the uniformity of quality demanded by the urban and export markets. Large-scale commercial operations based on monoculture can be more easily geared to meet consumer demand but can lead to disparities between workers and owners and can lead to problems with chemical pollution and biodiversity degradation.

Pioneer Shifting Cultivation

The pioneer swiddeners who populated the highlands above 800 metres altitude, brought with them the axe, the crossbow and the opium poppy, which is at once a food (poppy seed), a medicine (anti-spasmodic) and a narcotic (smoked directly, or smoked or injected as a derivative, heroin or morphine). The main pioneer cultivating groups are the Hmong, the Yao and the Akha, the most sophisticated, literate and monetised being the Yao and the Hmong. They were all originally paddy-cultivating groups in South-west China but were pushed uphill by continuous armed Chinese invasions.

Pioneer cultivators eliminate all trees and seed sources unlike the cyclic re-occupance cultivators who lop and retain tall trees as a seed source for bush fallow regeneration. When the successively cultivated pioneer swiddens are finally abandoned due to soil erosion and fertility decline, they are populated by weed grasses, particularly the fire-tolerant *Imperata cylindrica,* which is unpalatable to livestock except during its very early growth stages. Accordingly, these fields are burnt annually by graziers, effectively suppressing forest regeneration. Run-off from grassland is twice as high as for old-growth forest and evapo-transpiration less than half, so aquifer recharge is also repressed due to the absence of tree root channels penetrating the bedrock. Absence of tree roots also aggravates incidence of landslides, a source of severe sediment loading in tributaries and the main river. When grasslands are burnt late in the dry season the initial rainstorms may cause even further topsoil erosion.

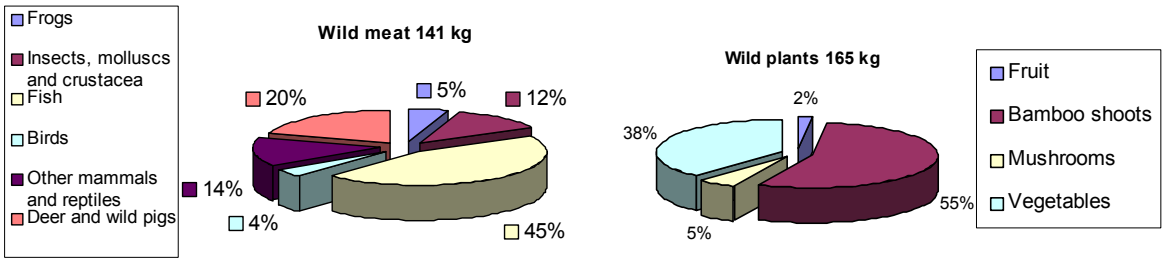


Fig 2.2.2. Forest products – household annual consumption by weight[7]

Cyclic Re-occupance Shifting Cultivation

The cyclic re-occupance shifting cultivators who populate the uplands and foothills, usually below 700-800 metres altitude, include many Tibeto-Burman, Mon Khmer and Vietic groups such as the Karen, the Khmu, etc.

The predominant livelihood system for the majority of the rural population in the uplands and highlands of the Lower Mekong Basin (LMB) is slash and burn shifting cultivation (swidden agriculture; a form of extensive agro-forestry), supplemented by the gathering of Non-Timber Forest Products (NTFPs), hunting and fishing.

[7] ICEM 2003

Under a typical swidden cultivation regime, a family would cut/slash between 1.5 - 2 hectares of secondary forest at the end of the cool-dry season in early February. The felled material is allowed to dry for several weeks during the hot dry season and is burnt in April / May before the rains start. When the rains commence, seeds of upland rice are planted in holes punched into the ash-covered topsoil using sharpened sticks. Seeds of other crops (vegetables, cotton, hemp, sorghum, spices, etc.) are inter-sown with the upland rice. The swidden fields, which are usually on steep hillsides, are weeded throughout the rainy season and the crops harvested at the beginning of the dry season in late October or November.

After one season of cropping, the plant nutrients in the top soil become depleted. Hence, the farmers allow the cleared fields to regenerate to secondary forest (bush fallow) in order to restore fertility of the top soil and suppress weed re-growth. The deep roots of the regenerating trees in the bush fallow draw nutrients from the sub-soil (beyond the reach of crop plant roots). These nutrients are then deposited on the top soil through leaf fall and from the ash resulting from the next cutting and burning event. Full restoration of soil fertility will not be achieved unless the bush fallow interval between each cropping phase is at least 7 years (on the best soils) and in other cases up to 12 or even 15 years.

Hence a typical family engaged in cyclic re-occupance shifting cultivation will clear and cultivate between 1.5 - 2 hectares per year but retain traditional use rights over 10-20 hectares of associated bush fallows at various stages of regeneration.

In addition to the foodstuffs grown on the cropped fields, other wild foodstuffs (both plant and animal), raw materials for building and handicrafts, other NTFPs and fuelwood may be garnered from the bush fallows and from the adjacent old growth forests. This cyclic re-occupance swidden farming system can support population densities of between 20 persons per km^2 (on the best soils) and 15 per km^2 or less otherwise. Traditionally under this situation approximately 50% of each village territory remains under primary forest which is preserved as a sustainable source of building timber and as a food security reserve in the event of crop failure (source of edible tubers, roots, shoots, leaves, fruits and wild animals).

Under mounting population pressure, however, shifting cultivation is not a system of agro-forestry remaining viable in the long term and has a significant opportunity cost with a poverty aggravating impact as follows:

When population densities grow in excess of 15-20 persons per km^2, a vicious cycle of increasing poverty emerges. Continuing population growth within circumscribed village territories leads to expansion of shifting cultivation at the expense of primary / old growth forest. This progressive loss of primary forest diminishes the food security reserve, damages watershed integrity and reduces atmospheric carbon sequestration.

Loss of old growth forest habitat degrades local bio-diversity and consequently reduces eco-tourism value, inter alia. To expand swidden areas between $10,000-$20,000 per hectare worth of standing timber from primary forest may be cut and burnt to fertilize a family's upland rice field that produces at best 2 tons of rice (worth $600) per hectare once every 10 year cycle; this equates to an average of $30/hectare/year. By comparison, in the same 10-

year period, the incremental timber growth of tall forest would amount to 20m^3/hectare (2m^3/hectare/year) worth $3000/hectare or $300/hectare/year.

When the primary forest area within a village territory has been largely cut and brought into the shifting cultivation cycle, then, under continued population growth, rotational bush fallow cycles have to be shortened, resulting in declining soil fertility recovery between re-use and hence subsequent lower crop yield and productivity. Where Decree 99 of the Land Law (1992) has been enforced by Lao officials, restricting people to four swidden fields per family, and allowing only a three year fallow period between crops, yields have declined, the land has lost its fertility, and there have been more weed infestations and rice shortages.[8]

The average family labour availability is sufficient to clear, plant and weed only about 2 hectares in any one year. With lowered crop yields per unit area and therefore lowered farm productivity, coupled with family labour constraints, the population becomes trapped into a vicious poverty spiral.

Rural communities facing such a situation will remain so trapped in an increasing poverty spiral unless there is intervention to develop alternative livelihoods based on agro-forestry systems that are sedentarised and of higher productivity per unit area and per unit of labour input.

However, it is important not to use this economic argument as a lever for enforcing drastic changes in agricultural practices across the board in the highlands. Although, in purely economic terms, the value of swidden culture is indeed extremely low, when carried out at an environmentally sustainable level it does support a very large number of people. And as has been emphasised above, it is an essential element in the maintenance of the high habitat diversity in the highlands that supports the globally significant ecosystem and its species. When practised at low intensity swidden has a comparatively light environmental footprint, with clear positive effects that must be preserved to maintain the environment that supports the ecosystem. In this respect, subsidising poor families who remain attached to this way of life is a small price to pay for the important contribution that it makes to forest ecology.

Sedentary Farming

Most of the ethnic groups in the uplands and highlands of Southwest China have learnt how to construct contours and terraces, but this is not generally the case in the hills of Myanmar, North Thailand or Lao PDR. Instead, swidden fallow cycles become too short and weed-infestation prohibitive, the dry season is spent in hoeing the topsoil deeply to kill weeds and oxidise some of the plant nutrients in the upturned subsoil to render them available to the roots of the subsequent crop. The ultimate result is severe erosion and eventual abandonment of the whole area to the regrowth of unproductive grasses and scrub, subject

[8] (Chamberlain J R, Alton C and Crisfield G. Indigenous People's Profile, Lao PDR, prepared for the World Bank by CARE International, Vientiane, December 1995. p 3).

to annual burning, and requiring centuries rather than generations to recover productive capacity for agriculture or forestry.
After irrigation system upgrading it is the contouring and terracing of cultivated hillsides that requires the most urgent attention in the form of technical and financial support.

Rainfed Arable Farming
Under this system, annual crops are planted every year without a respite under bush fallow, manures and fertilisers may be applied to maintain fertility. This agricultural practice may be sustainable on slopes up to 25%, provided that soil erosion control measures (e.g. contour bunds, terraces) have been installed on slopes between 5% and 25%. The main arable crops grown on sedentary rain-fed farmlands in China, Myanmar and north Thailand are upland rice, maize, mung bean, soybean and peanuts. Since the 1960s, in northeast Thailand and southern Lao PDR, cassava, sesame, sorghum, kenaf and sugarcane have been cultivated from time to time in response to the vagaries of demand from local and export industries. The expansion and diversification of commercial agriculture was triggered mainly by the expansion and upgrading of the road network in north-east Thailand. As oil prices continue to rise, it could be expected that the better quality arable soils in Thailand, southern Lao PDR and upland Cambodia sectors of the Basin would be devoted to sugarcane production, extracting ethanol for motor fuel from the juice and burning the bagasse for steam turbine electricity generation.

Irrigated Farming
Water used for irrigation is mainly obtained from river diversion, using surface irrigation – micro-irrigation and sprinklers are not used. At least half of irrigated land is not cultivated during the dry season, although dry season production may rise after if production has been poor during the preceding wet season. In the wet season up to 96% of irrigated areas may be used. Currently the State operates over one thousand irrigation schemes, covering around 106,000 hectares, whilst private schemes, mainly poorly maintained, cover around 60,000 ha. It is estimated that the total potential for irrigated agricultural production in Laos is in the region of 800,000ha, using approximately 3×10^9 m^3 per year (approximately 1% of the total available water supplies within the country).
Whereas hunting and gathering can sustainably support only two persons per square kilometre, irrigated agriculture on good soils with reliable water supply and sophisticated water distribution and drainage network can support up to two thousand. Compared to swidden cultivation, the sustainable population density supportable by rice-farming regimes irrigated by rainfall capture rises to between 50 and 100 persons per square kilometre. Exportable surpluses of cattle and buffalo and dry season off-farm labour become available to support urban construction or military purposes. When secondary forest is converted to hand-cultivated paddy field there is a decrease in overall annual evapotranspiration (because dry season stubbles do not transpire) and a consequent increase in aquifer recharge,

although (especially if stubbles are not burnt) there is a reduction in emission of carbon dioxide, a greenhouse gas. This may be replaced, however, by the emission of methane from rotting vegetation in the ponded water. Methane has four times the heat-insulating properties of carbon dioxide.

The potential for increasing fish production through aquaculture in flooded rice fields appears to be considerable, provided that suitable feedstuffs can be provided, water obtained without risk to natural fisheries, and seed fish fry obtained artificially rather than by fishing them from natural nurseries such as wetlands.

Wetland Farming

Particularly in rain shadow tracts, agriculturalists have cleared the flood forests from the edges of flood reticulation wetlands (including parts of the Tonle Sap Lake shores) for the cultivation of floating rice in the wet season and/or recession rice in the cool dry season as flood levels recede. In some cases, such as in the Lower Xe Bangfai Basin, in parts of the Mekong Delta and in Cambodia, flood control and irrigation infrastructures such as levees, canals, gates or pumps have been installed to enable the production of three rice crops per annum.

2.2.7 Fish resources and fisheries

Fish in the main rivers and tributaries

There may be as many as 1200 species of fish in the Mekong Basin, including at least 200 species of purely marine fish. Conventionally the freshwater fish species are divided locally into `White fish' and `Black fish'. White fish are mainly of the families Cyprinidae and Schilbeidae, and migrate into the main Mekong channels during the dry and early rainy seasons, spawning after the period of maximum river discharges. Black fish are mainly from the families Claridae, Siluridae, and Ophiocephalidae, and are more widely spread and tolerant of environmental conditions than White fish.

Fish diversity is very high in the streams of the Highland Forest and Annamite Chain ecosystems. Falls in the incised valleys allow downstream migration but block upstream movements, permanently isolating small fish communities upstream. Over long periods these small groups experience genetic drift that results in the evolution of a large number of related but still distinct species with very restricted distributions in the many headwater streams. Whilst this may be of interest to taxonomists, to mountain communities more concerned with subsistence such diversity is, for practical purposes, of little relevance – in biodiversity terms they are more concerned with species abundance than with species richness.

The Xe Kong river basin contains a long length of lowland riverine habitat that is immediately accessible from the Mekong main stream at Stung Treng. The Xe Kong, together with the Se San, is the largest unobstructed major tributary of the Mekong between

the Sap River and Khone Falls, and is therefore of very great importance in the dynamics of both the main river and of the Great Lake fisheries of Cambodia. Many of the strongly migratory species in the main Mekong and lower parts of the tributaries migrate upstream in the Xe Kong and its tributaries as far as the first major obstruction to migration - usually a high fall, such as the 20m high Xe Pa falls on the Xe Pian River. So in the main Xe Kong river, fish from the Mekong may ascend upstream as far as the dam site of Se Kong 4, and perhaps even further especially during strong floods which may make some falls passable to some of the more strongly swimming species.

Headwater fish stocks.

One aspect of the fishery resources that is of particular relevance to any development project affecting rivers, is the vulnerability of the poorly understood fish stock dynamics of the high mountain tributaries and headwaters, on which many mountain communities rely. Villagers in these areas report that they have no knowledge of dried fish, because they never catch enough to store long enough to warrant drying - all fish are eaten fresh as they are caught. This implies that dried fish from the lowlands is not traded up into the mountain areas, and that these communities are self-sufficient in regard to their fish supplies.

Aquatic invertebrates

Virtually nothing appears to be known of the aquatic invertebrate fauna of the upland waters, or of their importance as food for the fish stocks of these streams. In the Highland rivers they appear to be present in extremely small numbers, and many important fish food species are smaller in size than comparable species in temperate streams. This is important in terms of the highland and headwater fisheries, as the amount of aquatic food available to fish may be extremely limited. Much may instead be derived from the surrounding forest land, in the form of terrestrial insects, plant debris, etc. Consequently, land clearance close to streams may reduce fish production.

In the lowland zone, aquatic invertebrates caught in nets at the outflows of wet rice fields are an important source of subsistence protein. Pest (including mosquito) control is commonly the role of the abundant dragonflies that patrol these rice fields; attempts to use pesticides for this purpose are liable to eliminate these valuable predators as well as to introduce exotic toxic chemicals into the ecosystem and the human food chain.

Fishery production and trends.

Fish form a vital part of the diet of almost every person in the Middle and Lower Mekong Basin. An official estimate of the magnitude of fish available from the Mekong Basin by MRC in 1991-2 considered that the total annual catch was around 357,000 tonnes, of which about 8% (29,000 tonnes/year) came from aquaculture (MRC Secretariat, 1992). However, official statistics do not take into account non-marketed fish kept by fishermen for their own use, which may be 5 to 6 times as much as the amount sold in markets.

Because there is great uncertainty in the accuracy of the fishery production statistics, it is difficult to compare historical catch data. Catches in the Mekong mainstream are reported to have fallen severely in recent years due to an increase in trapping, use of explosives and monofilament gill net use. The river fisheries at Khone Falls are claimed by local sources to have declined by as much as 80% since 1970. In the Xe Kong, recent pressures on local fisheries are reported to have increased due to the presence of Vietnamese fishing groups using highly destructive fishing gear indiscriminately, from bases on the Cambodian bank of the middle Xe Kong river[9].

MRC currently estimates total Basin catches at around 2 million tonnes per year. The current average first sale value of fish in major markets in mid-1998 was in the region of US$ 1-2 per kg, suggesting that the present value of the Basin fish production could now be approaching US$2 billion/year, once multiplier effects from resale trading are taken into account. Seventy-one percent of rural households (2.9 million people) in Lao PDR are reliant on fishing to varying degrees for subsistence and additional cash income. The wild fishery is particularly important for the poorest people of the basin, as it supplies up to 80% of the protein in the diet.

2.2.8 Threats and issues in natural resources utilisation

2.2.8.1 Main trends within biogeographical zones.

Northern Highlands.

In this region the forest cover has been reduced by human activities and steep slopes subjected to swidden (shifting cultivation, also called 'slash-and-burn' cultivation) have accelerated soil erosion in some areas. The underlying cause is mainly pressure on land availability caused by population increases and in-migration, forcing a reduction in traditional rotation periods, from around nine to ten years to as short as three years. Incursion of Hmong people has also contributed to soil erosion, as they do not practice sustainable swidden rotation, but simply move on when a site is exhausted.

A more recent process of incursion is of particular concern. In-migration of Chinese people from Yunnan has increased substantially in recent years, in part encouraged by local provincial politicians. Chinese approaches to land management and conservation are not conducive to sustainable management of such a fragile ecosystem, and there is considerable concern regarding the long-term implications of this uncontrolled colonisation of the Northern Highland areas of Laos.

Annamite Chain.

Many of the NBCAs in this zone are located close to the international border with Viet Nam. However, their relative isolation is threatened by proposals to develop hydropower at

[9] MRC 2003.

a number of headwater sites. The consequential alterations to Mekong tributary flows that would result pose particular threats to the stability of a number of important fishery resources in both upland and lowland zones. A number of Protected Areas have been set up close to the border with Viet Nam, but recent developments in hydropower and proposed trans-basin road projects threaten the protective isolation and security of the wildlife resources of this region. Of particular concern is the new Ho Chi Minh Highway runing close to the border and bisecting important Protected Areas on the Vietnamese side of the range.

On the eastern sides of the range in Viet Nam, lowland Kinh people have cleared large areas and now plant monocrops of upland cash crops[10], which do not permit natural recovery of the poor soils. With the opening up of this region by the new roads, this activity could spread across into Laos, representing a serious threat to the sustainability of habitats within the Zone.

Lowlands.

In the Lowlands biogeographic zone, proposed future building of low-head dams in the Xe Kong and Se San basins threaten very large areas with inundation. These shallow reservoirs are expected to provide new habitats for wildfowl, but also represent potential centres for the increase in human and livestock parasitic diseases, including those, such as schistosomiasis, that are currently rare or absent in this part of the basin. and is continuous with the lowland areas of northern Cambodia. In addition the impacts of such obstacles to fish migration would be a major obstacle to maintaining aquatic resource sustainability in the middle and lower Mekong basin.[11]

2.2.8.2 Sectoral threats

Population changes in forest areas.

Population pressure in the highlands has been increasing, but it is unclear whether absolute natural regulatory mechanisms on population growth, such as maternal and infant mortality, disease morbidity and mortality rates, have changed in remote populations in recent years. In-migration by ethnic migratory groups such as the Hmong, who practise a non-rotational form of slash–and-burn, and of more recently displaced peoples from combat zones, have certainly caused conflict and resource competition in some areas of the Northern Highlands. Of more immediate concern is the recent spate of in-migration of Chinese into the Northern Highlands from Yunnan.

[10] Evans, Grant, 1992, "Internal Colonialism in the Central Highlands of Vietnam", *Sojourn*, 7(2) 274-304

[11] Philip Hirsch and Gerard Cheong 1996.Natural Resource Management in the Mekong River Basin: Perspectives for Australian Development Cooperation Final overview report to AusAID

The result of all of these has been severely increased local competition for scarce land on relatively low gradients used traditionally for growing vegetables, and the use of increasingly steep gradient hillsides for swidden. The consequent decrease in the fallow rotation period required for depleted swidden fields to recover fertility, and the rapid soil erosion on the steeper slopes, are critical causes of land degradation in many upland areas.

Hunting pressure

There are recent reports that hunting is causing severe declines in the populations of many endangered species throughout the region's more forested and mountainous areas, but its actual effect on the total biodiversity of such locations is still poorly recognised. In some areas, some of the more spectacular or commercially valuable species may be in decline, or even eliminated, but for the majority of species it may be that, whilst the numbers of individuals of some economically important species may be falling, species abundance may be relatively constant.

Commodity Markets and unregulated trading in natural resources and products

Non-timber forest products and phytochemical resources provide an opportunity for expansion, providing forests are protected and indigenous peoples permitted to exploit them under a system of managed resource allocation and regulation.

Potential valuable pharmacological substances may be discovered, facilitated by traditional knowledge and usage. Expansion in this field implies no adverse pressures upon the land or resources of the country.

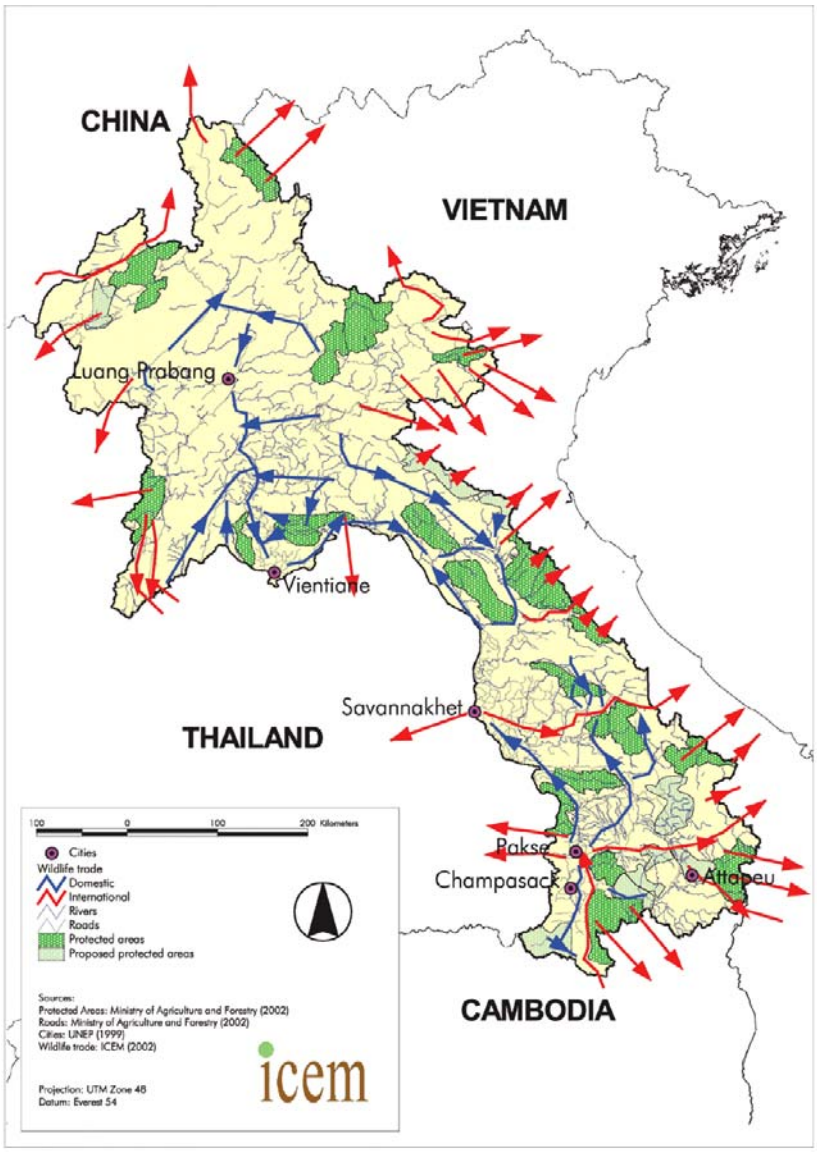


Fig. 2.2.3 Known routes of traded wildlife within Laos, and from Laos to the rest of the Basin

The capacity to manage and enforce the statutory protection provisions for Protected Areas is in urgent need of expansion, not least because developments in other sectors, notably the hydropower and transportation/communications sectors are placing increased pressures of the retention of these resources.

Trading in biological resources is effectively out of control, despite Laos' accession to international agreements banning or regulating the practice. Misguided attempts to resettle indigenous people from PAs and watersheds exposes them to depredation from incursants. Only managing the activities of local people living in such sensitive areas within the limits needed to stabilise them, and providing them with priority rights of access to, and exploitation of, their natural resources will limit incursion by unauthorised wildlife traders.

The real pressure on biodiversity in Laos appears to be exerted through the relatively recent widening of the commodity markets for species which were formerly used entirely for

domestic needs by forest communities. With the development of an external and lucrative market for exotic forest products, and the weakening of traditional attitudes to custodianship of forest resources induced by recent waves of destabilisation of settlement, the temptation to earn fast money by hunting and selling the catch to itinerant traders has led to a great increase in the rate of exploitation of forest resources. This can only be slowed by effective control of the present illegal trading pathways, and their replacement by officially endorsed and correctly managed domestic pathways, coupled with local title to these resources.[12]

Improved access to remote Highland ecosystems.

Indigenous peoples in the Highlands frequently express the wish for better access roads, and some projects providing low-grade foot or horse tracks have promoted some improvement to low-level trading and to health and welfare services in the Highlands. However, it also facilitates access by those seeking to exploit forest resources for personal gain, without regard to sustainability or the primary needs and rights of indigenous peoples to those resources. If such roads are made too large, they may become the means of access of illegal logging operations. Provincial development projects to improve forest roads should be assessed with extreme caution, as such schemes may be promoted by Government officials with the objective of selling illegal logging 'concessions' to organisations looking for prime export timber. Illegal and indiscriminate forest clearance for timber is now a major threat to the survival of the Highland forests, and this is dealt with elsewhere.

Hydropower potential

Laos has great physical potential for the development of hydropower, but actual implementation has been sporadic and hampered by well-founded environmental and social concerns. Nine large-scale plants, with an output capacity of 624 MW, were in operation in 2003[13]. The theoretic potential in Laos is estimated at about 18,000 MW, indicating a current exploitation rate of 3.5%. Hydropower is widely promoted as an 'environmentally friendly' form of power generation, but in fact experience in the Basin is that even supposedly low impact forms such as 'run-of-river' schemes (i.e., systems based on minimal storage, without a large headpond) such as Nan Theun Hinboun in Laos and Pak Mun in Thailand have been profoundly disruptive of both the environmental and the social sectors.

Conventional storage reservoir schemes, such as Nam Theun 2, have been subject to long delays and exceedingly detailed scrutiny of the proliferating updates of Environmental and Social Assessments, as assumptions made during initial planning stages were challenged by NGOs commissioning international experts to review the project planning documentation.

Despite being widely promoted as a 'green' form of energy generation, hydropower is extremely damaging to the environment. It also produces very considerable carbon

[12] Hirsch and Cheong 1996.
[13] MRC 2003

emissions in the form of methane, far more active as a greenhouse gas than carbon dioxide. It represents very severe source of social and environmental disruption, especially in the highly biodiverse and ethnodiverse context of Laos, and the effects of a number of schemes have received extensive coverage and prominence internationally, yet it still continues to be over-sold to the public. Despite absurd official reassurances that 'more water means more fish', both run-of-river and storage schemes have been found to result in reductions of fish catches, both upstream and down of the dam, in some cases as high as 90%.Fish constitutes up to 80% of protein for many communities in Laos, and the sensitivity of the extremely important river fisheries, worth an estimated US$2 billion per year, to even small hydrological changes in the river system, indicates that support for such projects is a highly risky and challenging undertaking.

Pressures to develop hydropower

Project	Year of commissioning	Installed capacity (MW)	Active storage (Mill. m^3)
Nam Ngum 1[i]	1972-78 (export)	150	4714
Huoay Ho	1999 (domestic.)	150	480
Nam Leuk	2000 (domestic.)	60	123
Xepon	2008 (domestic.)	74	361
Nam Lik	2009 (domestic.)	100	826
Nam Theun 2	2010 (export)	1074	3510
Nam Theun Hinboun Ext.	2010 (domestic.)	105	2870
Xe Kaman 3	2011 (export)	250	108
Nam Ngum 3E	2011 (export)	580	983
Nam Ngum 2B	2012 (export)	183	150
Nam Ngum 5	2012 (domestic)	90	252
Xe Kaman 1	2014 (export)	468	3340
Nam Ngum 4A	2015 (domestic.)	55	337
Nam Kong 3	2016 (domestic.)	25	299
Xe Kong 5	2017 (export)	248	2210
Nam Bak 2B	2018 (domestic.)	116	119
Xe Xou	2020 (domestic.)	59	1710

Table 2.2.3 EdL Generation Expansion Plan (2004-2020) for Domestic Projects and the most promising Export Projects

In Laos, pressure to develop hydropower schemes comes mainly from international interests in response to external markets for electricity, notably Thailand. Schemes may be grossly overblown for covert commercial ends – for example, the Xe Kaman 1 dam was designed at

the maximum possible height, apparently to ensure that the reservoir would flood the greatest possible forest area, providing an excuse for extensive 'permissible' logging in defiance of the general ban on logging. Analysis revealed that this huge reservoir would have taken seven years to fill, unacceptably delaying hydropower generation and investment returns.[14]

The administrative system whereby such schemes are given Governmental approval is open to profound abuse. Once a scheme has a 'Memorandum of Understanding' (MOU) the prospective reservoir area is open to predatory logging and other resource exploitation regardless of the interests and traditional access and utilisation rights of indigenous inhabitants.

Pre-emptive logging

Although logging is officially banned, there is an exception for areas which will be developed, but the clearance of timber from proposed reservoir area long before the final agreements on funding were signed has resulted in severe ecological and social damage. At Nam Ngun only the prime timber was removed from the reservoir area before it was flooded, leaving low value timber standing. The resultant expanse of dead tree stumps is both an eyesore and an environmental disaster, as they snag fishing nets which then continue 'ghost fishing' for long periods after their remnants have been abandoned by fishermen.

External political pressures

But external political pressures also operate to force unsustainable schemes towards implementation. The Se San, Xe Kong and Nam Theun Basins Hydropower Study initially rejected all proposed potential hydropower sites in Cambodia on the grounds that they were liable to cause severely adverse environmental and social impacts and also to be economic unsuitable. However, threats of a diplomatic incident forced the study to revise its recommendations to include two highly damaging sites on the Se San river that would inevitably attract severe criticism from both ethical donors and from NGOs worldwide.

Impacts of hydropower on fisheries

From the perspectives of the fisheries the entire Mekong Basin may be considered to be a single ecosystem, since there is very widespread mobility of species within the unobstructed part of the river system. Any activity that affects accessibility to part of the system has potential repercussions elsewhere in the system. Dams and hydropower present a much greater threat to the fisheries than was originally recognised.

The construction of a diversionary weir at Nam Song in Lao PDR seriously disrupted the natural river flow patterns of the Nam Song River, which is part of the Nam Ngum sub-

[14] Halcrow. Se San, Se Kong and Nam Theun Basins Hydropower Study, 1998

catchment. Following completion of the Nam Song weir in 1996, 40 fish species disappeared and 20 trans-boundary migratory fish species were lost from catches in neighbouring countries. Of these, 20 species were trans-boundary migratory or long distance migratory species. Above the Pak Mun dam in Thailand only 96 species out of the original 265 now occur above the dam.

Habitat fragmentation

One form of enhanced access to remote habitats in the Highland seems to be unrecognised in almost all development studies involving hydropower. Apart from the need to build new primary access roads into the main development site, when the dams are completed many will flood hundreds of kilometres of several formerly inaccessible valley bottoms penetrating far into the headwater. The resultant linear lakes provide easy boat access into even the most remote areas, allowing poachers to exploit wildlife that was formerly protected by the terrain and lack of road access. But they also have a direct effect on biodiversity itself.

Such schemes fragment large parts of the ecosystem, as the flooded valleys may be insuperable obstacles to the migration of some land animals. The issue of large-scale habitat fragmentation by hydropower schemes in Laos was first raised as recently as 1997[15], but appears not to be fully appreciated by many project preparation missions.

Selective elimination of upland valley bottoms by reservoirs

Valley bottoms are important habitats for both wildlife and humans in the highland areas. They provide corridors for the movement of some wildlife species, and also hold small areas of sedimentary deposits that can be used for growing vegetables, and even for small diversion irrigation schemes. They are exceptionally vulnerable to hydropower projects, which may eliminate as much as 99% of all such habitats in upper catchments and watersheds. Whilst the possibility of flash floods in such valleys is eliminated, the obstruction of territorial movement and migration pathways by terrestrial animals is a serious biodiversity issue that is rarely recognised.

[15] Cross D. (1997). A method for quantifying the ecological fragmentation of watersheds caused by hydropower development: Methodology Working Paper No. 2, International Workshop on EIA methodology, Phnom Penh, Sept 1997

2.3 Sociological conditions

2.3.1 Population density

Population in Laos is increasing at the rate of around 2.6% per year. In the 1985 Census the total population was 3.57 million, and it is now estimated at around 5.5 million. The National crude birth rate is about 45 per 100,000, and the crude death rate about 16 per 100,000. Birth rates are lower in provincial capitals, mainly due to the better availability of contraception.

Vientiane is the only large city in Laos. Its population was approximately 250,000 in 1985,but with recent upturns in the marketing opportunities, the current growth rate is in excess of 5% per year. Some other urban centres have also experienced accelerated growth in recent years. Officially, 15% of the population is classified as urban.

2.3.2 Ethnicity

Lao PDR is an ethnically diverse country, whose dominant lowland Lao population makes up 50-60% of the national population. Officially there are 68 ethnic groups, classed into lowland (Lao Loum), made up of a number of Lao and Thai groups, approximately 30% of upland (Lao Theung) mostly of Malay and Mon-Khmer descant, and 10-20% of highland (Lao Suung) peoples of Hmong, Mien and other upland mountain ethnic groups.

There is a correspondingly wide range of cultural beliefs and traditions, as well as of cultivation practices. This has led to some conflict especially between lowland and upland areas. Increasing pressures on upland area subsistence land availability has led to declines in swidden fallow rotation periods and some land degradation, in parallel to forest depredation by illegal logging and watershed changes caused by hydropower development.

Traditionally, social values are based on family ties and, in some ethnic groups, clan structures, but the effect of work migrations, in which young women travel to work in the main towns and Vientiane city and young men look for work abroad appear to be changing this pattern. Family structures and inter-generational links are weakening, especially in urban areas.

2.3.3 Urban and rural societies; wealth and poverty.

The great majority of people in Laos live in rural areas – estimates vary between 70% to 85% depending on how rural areas are defined. However, official statistics include provincial centres that are as urban areas. However, many are effectively large villages, and even within these and the main city of Vientiane itself there is a considerable amount of secondary subsistence cultivation by a large proportion of the resident population that

requires a more flexible assessment than is conventional of the socio-economic features of urban life in Laos.

Rural economies depend primarily on a non-cash system of resource gathering, although the material standard of living is not high. However, customary rice loans are available in most villages for those experiencing a bad year, and most rural shelter is self-built, with no dependency on land ownership or access to money. Lowland villages are often relatively wealthy, and even produce rice surpluses that stabilise food sufficiency, but mountain communities may not produce enough for their basic needs, and in bad years may need to be supplied from Government reserves or aid organisations. Chronic marginal food production and lack of access to, or inability to pay for, medical care and education are continuing problems. Orphans, handicapped persons and the elderly are generally supported within the family group, as there is no social welfare system.[16]

The average annul per capita income is estimated at around US$350, but in purely monetary terms this may be very much less in poor rural communities. There appears to be no clear estimate of urban income levels, but the range of family incomes in Vientiane is clearly extremely wide, and recent expansion in tourism and other economic activities has led to a very rapid escalation in income that is reflected in the remarkable increase in traffic within the city in the past five years. Until recently urban beggars were almost unknown, but a negative impact of this economic expansion is that there is now a marked increase in this activity, particularly in the more popular tourist locations.

Government officials' salaries are minimal, and many depend on income from other activities from their family members to meet the higher cost of living in the city. Small traders appear to obtain adequate income from a wide range of shops and businesses, but there is still a stratum of society that clearly has access to much greater economic resources, not all of them legitimate.

Between the years 1992 and 2003 the number of people living in poverty declined from 45% to 30%, but the rural/urban divide shows that there remains real inequalities in the relative standards of living. The incidence of poverty in rural households is 41% compared with 29% in the towns, and virtually all indicators of welfare standards show similar disparities. The National Growth and Poverty Eradication Strategy is aimed at reducing poverty, incorporating the Millennium Development Goals, which are now mainstreamed in the programme.

2.3.4 Gender inequality

The issue of gender in natural resource management and utilisation is often over-simplified as one of the different roles of men and women in rural agricultural communities. There are significant differences between the work carried out by women and men, and by the access of women to resources. At urban and central levels too, the heavy preponderance of males

[16] US Library of Congress 2005

at all levels of administration and governance reflects the male-dominated nature of Lao society, although there are signs of increasing involvement of women in policy making, planning and environmental management. The following issues have been identified as crucial to equitable consideration of the role of women in society:

- household production activities and the role of men and women in the household economy
- health, nutrition and access to basic resources (water supply and fuelwood)
- population pressure on resources and the status of family planning initiatives
- land (and where applicable water and forest) tenure issues
- access to and availability of credit (with special reference to female headed households)
- agricultural extension, marketing information and farmer training initiatives
- access to and participation in the media
- participation of men and women in community resource management organisations, and their decision making structures, and formal political structures; the under-representation of women in sectoral resource management agencies, for example forestry enterprises and agricultural extension services
- rural-urban and rural-rural migration (who leaves the village? What are the implications for those left behind?)
- the role of mass organisations, such as the Vietnamese Women's Union, and indigenous and foreign NGOs[17]

2.3.5 Land tenure and resource accessibility

In rural areas tenure is solely the function of customary utilisation of specific areas of land, since all land rights are now vested in the Government. Where communities are stable and have occupied land for long periods, allocation under a local community system of agreement and control is commonly practised. Recently, such management has been challenged by the development of large scale projects that eliminate land entirely, such as the large hydropower schemes of Nam Ngum and Nam Theun 2, by Government policy aimed at reducing population pressures in National Protected Areas, and by illegal allocation of logging concessions by corrupt politicians.

Incursions, either permanently by Chinese in the north, or to a lesser extent transiently by Vietnamese hunting and fishing parties in the east and south, represents a significant escalation in the rate at which natural resource access by Lao people is being eroded. In some highland areas, the rapid growth of commercial cash crops such as coffee and new timber crops, has resulted in the conversion of primary and secondary native forest into monocrop areas with very impoverished biodiversity, and consequently reduced resource value for local people.

[17] Hirsch and Cheong 1996

The development of commercial value for a wide range of environmental goods, including even water, places increased pressures on them and promotes uncertainties about the relative tenurial rights of indigenous peoples to resources that they have traditionally enjoyed without question. commercialised systems. Much of the ecological damage and alienation of traditional farmers from access to their resources can be attributed to the development of commercialisation of the resources, and the unscrupulous exploitation of them by entrepreneurs uninterested in issues of unconfirmed ownership and the long-term implications of their activities.

2.3.6 Access to water

The total renewable supply of fresh water in the country is estimated at 270 x 10^9 m^3 per year, equivalent to 54,000 m^3 per person per year, compared with an estimated per capita demand of 228 m^3/year. Total water abstractions total around 1 x 10^9 m^3 per year in 1987 (approximately 0.3% of the total supply), of which 8% is used for domestic purposes, 10% for industrial use, and 82% for agriculture. There is therefore considerable scope for further exploitation of water resources in Laos, and in simple terms water availability is not a limiting factor in development.

Urban water supplies

Only 60% of urban populations receive a direct domestic water supply. Water for domestic use (but not for drinking) is commonly obtained from shallow wells or surface streams. Urban water supplies are the responsibility of the Urban Planning Department within the Ministry of Communications, Transports, Posts and Constructions, whilst the Water Supply Company is responsible for planning and developing all works for producing and distributing drinking water.

Rural water supplies

In rural areas, water supply is the responsibility of the Ministry of Health under the Clean Water Project. Rural water sources are mainly springs and shallow wells. Wells have been dug throughout the country, but yields are generally low, between 1 and 5 litres per second. Only about 51% of rural households are claimed to have direct access to good quality water supplies, but in fact only about half of these systems actually function, due to poorly selected technologies and a lack of spare parts to maintain them.

Water quality

Water quality in the Mekong basin is generally satisfactory, and there has even been a trend towards improvements in recent years. Saline discharges from the Khorat Plateau appear to be decreasing, in part at least because dry season flows have increased as the result of discharges from small-scale irrigation impoundments. Nutrients liable to lead to

eutrophication (nutrient enrichment and the development of unwanted algal growth), such as nitrate and phosphate, are also decreasing except near large population centres, such as Vientiane, and in areas of intensive agriculture, especially the Delta. The suspended solid loading of the river water has also decreased, almost certainly as the result of the construction and filling of the Manwan Dam in China in 1992.

Increasing pressures on surface water quality are developing due to the expansion of human and domestic animal populations and increasing contamination from garbage and other anthropogenic wastes. The length of rivers where water quality is adversely affected by human activity was estimated in 1997 at 10 percent with severe impact, and 20 percent with moderate impact.[18] This is expected to rise as urbanisation increases.

Sources of contamination currently include

- the discharge of untreated or partially-treated human sewage;
- the practice of combining sewage with storm water drainage
- the emptying or overflowing of septic tanks and cess pits
- the use of untreated night soil in agriculture
- seepage from pit latrines
- defecation in the open
- pollution by the waste from intensive livestock operations
- contamination from people bathing or washing clothes in water courses.

2.3.7 Hygiene and sanitation

Lack of adequate hygiene and sanitation results in contamination of even good quality water, leading to significant morbidity and mortality from water-borne and water-related bacterial, viral and parasitic infections. Monitoring of the incidence of these diseases is poor, and this sector is in urgent need of support and improvement.

In rural areas sanitation is generally crude or non-existent, whilst many rural sanitation systems are coming to the end of their working life, and require extensive funding for rehabilitation. Where preventive maintenance is inadequate, systems are declining even faster.[19] Rural sanitation schemes similarly suffer from poor planning, unreliable water supplies, and socially inappropriate design and location.

2.3.8 Access to health care

The Lao health care system is based on a network of 3 central hospitals, 18 provincial hospitals, 140 district hospitals, and about 500 health centres. There are about 12,000

[18] ADB. 1997. National water sector profile Lao PDR. Unpublished draft. Asian Development Bank, Manila. 33 pp.
[19] Webster, D. & L. Ti. 2002. Guidelines on strategic planning and management of water resources. Draft. ESCAP. Bangkok. 44 pp.

villages with approximately 1,200 of them having a revolving drug fund managed by a village health volunteer or provider.

Regular outreach services to villages are restricted mainly to immunisations, although other programmes such as malaria and family planning have limited outreach. The Expanded Program of Immunisation (EPI) has increased its coverage to reach the majority of villages, and measles has been removed as a major cause of child mortality. However, the coverage of medical facilities and health personnel is still limited and remains of poor quality. Government health facilities are frequently under-utilised, probably due to a combination of poor accessibility, lack of knowledge about the advantages of health services, and a lack of confidence in the health service.

There are 2,000 private pharmacies and they are often the first contact of people with the health care system. About 2/3 of current health expenditure is directly from households, 1/3 used to pay fees at government health facilities and 2/3 used to purchase treatments from private sources, mainly pharmacies. The only mental health services are in Vientiane at Mahosot Hospital and Military Hospital 103.[20]

Rural and provincial health personnel work under unsatisfactory conditions: salaries are low and seldom paid on time, necessary equipment and supplies are unavailable, and superiors offer little supervision or encouragement. Healers who know how to use traditional medicinal plants are important in urban as well as rural locations, and are often consulted for common illnesses.

Spirit healers are also important for many groups, in some cases using medicinal plants but often relying on rituals to identify a disease and effect a cure. In the absence of a widespread system of health workers, local shops selling drugs are an important source of medicines and offer advice on medication. However, these pharmacies are unregulated and their owners unlicensed.

Chronic moderate vitamin and protein deficiencies are common, particularly among upland ethnic groups, whilst poor sanitation leads to a high incidence of bacterial and parasitic diseases associated with unsanitary conditions. The life expectancy at birth for men and women in Laos was estimated in 1988 at forty-nine years, the same as in Cambodia but at least ten years lower than in any other Southeast Asian nation.

High child and infant mortality rates strongly affected this figure, with the Ministry of Public Health estimating the infant mortality rate at 109 per 1,000 and the under-five mortality rate at 170 per 1,000 in 1988. The United Nations Children's Fund (UNICEF) believed these figures underestimated the true mortality rate but still represented decreases from comparable rates in 1960. Regional differences were great. Whereas the infant mortality rate for Vientiane was about 50 per 1,000, in some remote rural areas it was estimated to be as high as 350 per 1,000 live births; that is, 35 percent of all children died before the age of one.

[20] Mental Health Situation Analysis In Lao People's Democratic Republic. Bertrand D and Choulamany C, Mahosot Hospital, Vientiane, December 2002

2.3.9 Resettlement and mental health

Resettlement of forest-dwelling people is generally disruptive and even dangerous to the well-being of those separated from their traditional lands. A number of ethnic groups in highland zones are culturally ignorant of the very different survival and farming skills needed to establish themselves in the lowlands. In addition far too little attention has been paid to the psychological issues raised by resettlement. For many groups there is an intense spiritual attachment to traditional lands, and if forced to relocate elsewhere they may become clinically depressed and unable to cope with the new environment. In some cases their life expectancy is dramatically reduced.[21]

Problems of mental health are poorly understood in Laos, and the provisions of adequate psychiatric and psychological services and expert counselling for resettled peoples is almost unheard of. Any development that results in forced, or coerced, resettlement of vulnerable ethic minorities needs to be treated with extreme caution, and safe alternatives provided wherever possible.

2.3.10 Education

Currently, spending on education consumes 2.3% of GDP, and 8.8% of Government spending. Of this 47.3% is on primary, 20.5% on secondary, and 19,8% on tertiary education. Adult literacy has risen significantly over the past 15 years, whilst youth literacy has reached around 80%. However, inequity in female literacy remains significant, with only 55% of females aged 15 and above classed as literate compared with 78% of males. Differences are more pronounced in rural areas, where education facilities are relatively poorly developed and supported, and the proportion of female enrolment falls at each level of education.

Although quantitative and qualitative progress in education has been made in recent years, a significant proportion of children, especially girls and ethnic groups in remote areas, is not guaranteed an equal opportunity to a basic education. Access to secondary and tertiary education is particularly limited and a significant proportion of the adult population is illiterate.

Economic growth coupled with rapid population growth is increasing the demand for education services and for vocationally qualified people. The quality of education available is currently inadequate to meet economic and social demands, even for the few who complete it. Education is a key focus area to assist in poverty eradication efforts. Although more investments will be needed to provide the physical infrastructure, significant attention will need to be paid to the recurrent expenditures in the education sector. Efforts will need

[21] Dennis J, in Halcrow 1998. Op. Cit..

to be made to improve the quality of education material, its sheer availability, and to improve the quality of teachers, to have a higher impact on improving performance in the education sector. Furthermore, ethnic diversity poses specific learning challenges regarding language mediums for classrooms. [22]

2.3.11 Employment

Rural employment is based almost exclusively on subsistence agriculture, fishing and the collection of non-timber forest products. In some areas cash crop production has expanded, but in at least one – opium poppy cultivation in the northern provinces, successful international and national efforts to eradicate the opium trade have resulted in severe difficulties for former cultivators because no alternative cash crop has been provided. Pressure on wildland resources, and on the fisheries at locations affected by hydropower dams, has resulted in migration towards the larger population centres in search of work in the expanding urban industrial sector. In addition, up to 100,000 people travel to Thailand every year to take up seasonal agricultural and urban work.

For some women, working in the sex trade has provided a new source of income, particularly where there is a large number of available itinerant workers, and prostitution is now an active sector in Vientiane and some other locations. Cross-border trafficking of women and young girls, mainly to Thailand, but some to China, is a growing problem. Some victims of this trade may be treated harshly by officials on their return to Laos.

The industrial and handicrafts sectors have expanded considerably (annual increases of up to 8.6% and 74.6% respectively). Garment manufacture is also increasing, whilst timber products and coffee output remain level. Mining is a growth industry, with new gold, copper and zinc operations opening in recent years, and the number of small, medium and large factories producing a variety of goods is increasing strongly, offering labour opportunities to both skilled and unskilled workers.

There is therefore a strong net in-migration to the urban centres with a consequent increase in urban congestion and traffic pollution, although the latter is not yet at a level that causes concern.

2.3.12 The urban environment

With its large and rapidly expanding population, Vientiane is the only large urban agglomeration in Laos. Although nominally the country's main city, Vientiane remains essentially an agglomeration of villages, with distinct local communities of linked families, many of whom still practise agriculture and livestock keeping on a small scale within the town itself.

[22] UNDP 2005. Millennium Development Goals at a Glance Lao PDR

The expansion of Vientiane in recent years has attracted large numbers of workers into the town, and the slow progress of road reconstruction has failed to prevent localised traffic congestion at peak traffic periods. The most prominent environmental issues are now the continuing inadequacy of the sewerage disposal system and traffic issues such as noise and air quality. The former is under review and upgrading is in progress, whilst the latter is not yet so severe that it represents an environmental problem. No detailed data on air quality are available.

Within the town, the very considerable rise in tourism has led to a proliferation in cheap accommodation directed particularly at young 'back-packers', and the colonisation of the river bank by *al fresco* restaurants. Accompanying the development of tourism, the number of ladies of negotiable affection (officially known as 'commercial women') has risen very sharply, bringing with it increased risks of the spread of sexually transmitted diseases that the medical service is poorly equipped to deal with.

In provincial towns these trends are also present but less marked. Sewerage disposal systems remain virtually unknown, and medical services are extremely weak. Employment is still mainly based on traditional rural economies, but the expansion of the rural roads infrastructure is opening up areas that were formerly very inaccessible, especially during the rainy season.

2.3.13 Environmental degradation and Disaster risks

A number of social developments present actual or potential future risks for environmental problems.

2.3.13.1 Waste disposal

Domestic waste disposal in urban areas is unsatisfactory, and the growing population of larger towns requires competent waste management planning if future land and water contamination is to be kept within acceptable limits. Developing industrial threats to surface and ground water sources are discharges from industries such as paper mills, textile mills and chemical factories, as well as the newly emerging mining of toxic metals such as zinc and copper or the highly threatening use of cyanide in the new gold mining sector. Pesticide and fertiliser usage in Laos is presently fairly low, but may become more of an issue as agricultural productivity expands.

2.3.13.2 Intra-basin pollution transfer

The risk of exported water contamination, in which polluting substances are released in an upstream riparian State and travel downstream to lower riparians, is recognised as a potential future Basin-wide issue. The recent acceleration of agricultural and industrial development upstream in Yunnan is an indication that Basin-wide co-operation and vigilance need to be established.

2.3.13.3 Arsenic in groundwater

Recent surveys suggest that arsenic may be a significant future problem in parts of Cambodia, Lao PDR and Viet Nam, particularly along the Mekong River. The problem originates in deeper groundwater reserves in contact with arsenic-bearing deposits washed down from the headwater areas during the formation of the basin. At present the risk is unclear but affected wells can be identified and alternative water supplies provided to those dependent on them. While arsenic in groundwater remains a serious issue, risks need to viewed in the context of more immediate and widespread issues raised by microbial contamination and the presence of fluoride in some areas.[23]

2.3.13.4 Public health epidemic risks

With increasing urbanisation, already poorly provided hospital services are coming under increasing pressure, both from systemic illnesses and from traffic and industrial accidents. The growth of the sex trade demands urgent attention to contain the increase and spread of sexually transmitted diseases. Urban water supplies and public sanitation systems are not developed sufficiently to ensure that water-borne diseases are under full control.

2.3.13.5 Flood risks

With increasing populations living close to main rivers, the risks to life and property from flooding are increasing. To some extent this may be mitigated by the development of new water control infrastructure in the power and irrigation sectors, but this itself brings additional problems – for example the consequential loss of an essential component (fish) in the diet.

[23] WHO. 2002. Key points and recommendations from arsenic and water quality roundtable. Bangkok. 8-9 March 2002. World Health Organisation, Geneva. 6 pp

2.4 Indicators of environmental conditions

2.4.1 Availability of data

Whilst there are numerous reports containing statistical data on environmental resources, formal indicators are less easy to find. Where the do exist, the reliability of the data on which they are based is frequently low. For example, fishery landings do not provide an accurate indication of the actual catch taken by all direct users of the resource. Large proportions of landings, and in many cases where fishing is a subsistence activity, the entire catch may be retained and not traded. Incursants from Viet Nam are using fine monofilament nets to take large but unquantifiable catches of fish from the Se San and Xe Kong basins; these are taken directly back to Viet Nam. Similar problems exist in attempting to quantify trends in resource availability in wildlife and bushmeat, subsistence plants, timber, and so on.

Similarly, collection of data on environmental conditions in urban areas is sporadic, if it is even done at all, and what few data are available are agglomerated from sporadic and disparate sources obtained at infrequent or random times. Bearing in mind the uncertainties inherent in such data, a large number of numerical indicators of environmental quality of varying reliability are accessible through the UNEP Data Portal (http://geodata.grid.unep.ch/ covering air and climate, freshwater, forests, threatened animals, protected areas, land, socio-economic indicators, and disasters. For conciseness in this report, these are not reproduced here.

The following extracts from the current Millennium Development Goals (MDGs) provide relevant data on environmental indicators that are internationally comparable. The baseline data may be compared with the stated MDG in order to appreciate where current national achievements fall short of the MDGs, and thus provide an indication of those areas in which particular effort is needed to bring the country in line with its declared socio-economic targets.

2.4.2 Millennium Development Goals for Lao PDR

Goal 7: Ensuring Environmental Sustainability			
Target 9: Integrate the principles of sustainable development into country policies & programmes, & reverse the loss of environmental resources	1990 Baseline	2015 Target	Lao National Targets
025: Proportion of land forest cover	47% (1992)	Target under consideration by Lao Government	Lao National Target is to Eliminate opium eradication totally by 2005 and put an end to slash and-burn cultivation by 2010. Lao National Target is to establish 500,000 hectares of new tree plantation (2000-2020) and reduce the area of shifting cultivation to a minimum level (up to 2005)

Indicator	**1990 Baseline**	**2015 Target**	**Lao National Targets**
026: Area protected to maintain biological diversity as proportion of total surface area (percent)	11.9% (1993)	Target under consideration by Lao Government	
028.1: Carbon dioxide emissions from fossil fuels (metric tons per capita)	0.1 metric tons per capita	Targets not set. Lao PDR does not produce enough CO2 emissions	
028.1a: Carbon dioxide emissions from all emission sources (metric tons per capita)	4.1 metric tons per capita		
028.2: Consumption of ozone-depleting chlorofluorocarbons	50.1 metric tons of ozone depleting material	0 metric tons of ozone depleting potential	
029: Proportion of population using solid fuels (percent)	97% (1995)	Target not set. Lao PDR does not produce enough CO2 emissions	

Target 10: Halve, by 2015, the proportion of people without access to safe drinking water			
030: Proportion of the population with sustainable access to improved water source	28%	80%	Lao National Target is to improve accessibility to clean water to 70% of all villages and to sanitary latrines to 50% (1996-2000)
031a: Proportion of [urban] population with access to improved sanitation	11%	70%	Lao National Target is to increase the supply of clean water to 75% of urban households (1996-2000)
Target 11: By 2020 to have achieved a significant improvement in the lives of at least 100 million slum dwellers			
032: proportion of households with access to secure tenure, urban areas (percent)	90.7% (1995)	Target not set as not considered to be a major issue for Laos	

2.4.3 Comments on Lao national targets.

2.4.3.1 Elimination of opium culture

Most of the indicators have no stated overall national targets. Of those few that do those dealing with Target 7, goal 9, indicator 025 give rise to concern. Opium poppy culture eradication is currently claimed to have been achieved, with the last province (Champassak) having declared itself free of poppy culture at the beginning of June 2005. However, whether this will be sustained is unclear as the cultivation season has just started with the onset of the rains, and in those villages where poppy culture has been eliminated there is considerable hardship because no alternative cash crops have been introduced to replace them. Consequently, whilst an international goal has been reached, poverty has actually been exacerbated by an ill-informed and unbalanced drive to achieve one goal without regard to its inevitable adverse impacts in the communities reliant on this activity. The same problem has occurred frequently in the past, for example in Afghanistan and Columbia.

2.4.3.2 Elimination of swidden cultivation

The objective to reduce end slash-and-burn cultivation to a minimum level by 2005, and to further 'eliminate' it by 2010' is misplaced and unnecessary. Properly managed, swidden cultivation is able to provide a very significant proportion of the nation's food sufficiency. Whilst some reduction in swidden intensity is certainly an urgent need, there is as yet no reliable estimate of how much swidden needs to be reduced to re-establish its long-term sustainability for those peoples who wish to retain this form of lifestyle.

Proposing to eliminate it entirely is a dangerous threat to very large numbers of people who know of no other way of survival, and is in any case entirely unjustified.

It is a serious violation of the human rights of traditional resident swidden cultivators, who may have occupied the same villages and land for up to three thousand years. Instead ways need to be devised to reduce pressure on existing swidden land, and to protect the managed access of those people traditionally using specific areas, and remove those who have no tradition of occupation in such areas. This will require a major support programme and, if possible, re-education of those resettled (and of government officials opposed to all swidden) to ensure that they are able to survive and thrive in alternative sites where their presence will be less detrimental to both the environment and to the welfare of those in the new resettlement areas.

2.4.3.3 Forest cover.

The very rapid loss of forest cover in the past 15 years, down from 47% to around 34% now, is a matter of extreme concern. Reports indicate that much of this continuing loss is not attributable to poor people clearing land but to high-level connivance between officials, the police and the army in illegal logging operations or to the sale of concessions for plantation developments. Without strong enforcement of compliance with the legislative framework already in place, this destruction will continue.

2.4.3.4 Scale of the Protected Areas.

Enlarging PAs will be of little relevance if more attention is not paid to the highly detrimental effects of increasing access to remote areas, especially by cross-border roads to Viet Nam with is the largest market for Non-Timber Forest Products – including prohibited wildlife and plants. It is not area that is critical, but accessibility.

2.4.3.5 Carbon trading.

The current rapid rate of loss of forest cover, and the consequential uncertainty as to whether any forest area nominated for any specific carbon trading agreement will actually remain as standing timber, make any commercial agreements in this field of extremely dubious validity. Until forest protection is not merely a poorly-enforced policy but a reality, the concept of carbon trading in Laos is meaningless.

2.5 Indicators of social conditions

Statistical data on social indicators is extremely patchy for Laos. The following extracts from the current Millennium Development Goals (MDGs) provide relevant data on social conditions that are internationally comparable. The data may be compared with the stated MDG in order to appreciate where current national achievements fall short of the MDGs, and thus provide an indication of those areas in which particular effort is needed to bring the country in line with its declared socio-economic targets.

Note some indicators refer to only one time-set for an indicator, whilst others provide for comparison between two dates, so that an assessment of recent progress in moving towards the meeting of the indicated goal can be seen. Where no data are available for single time-set indicators, or for the later of two specified dates for an indicator, the collection of adequate new data to establish the most recently feasible obtainable numerical value of the indicator should be addressed as a priority requirement. Such parameters are identified in the following Tables with an asterisk (*).

2.5.1 MDG1. Goal 1: Eradicate extreme poverty and hunger – MDG1. Goal 2: Achieve universal primary education

Population living below $1 a day (%), 1990-2001	26.3
Poverty gap ratio (%), 1990-2001	6.3
Share of poorest 20% in national income or consumption (%), 1990-2001	7.6
Children under weight for age (% under age 5), 1995-2001	40
Undernourished people (as % of total population), 1990-92	29
Undernourished people (as % of total population), 1998-2000	24
Net primary enrolment ratio (%), 1990-1991 ..	ND
Net primary enrolment ratio (%), 2000-2001	81
Children reaching grade 5 (%), 1990-1991	53.8
Children reaching grade 5 (%), 1999-2000 ..	ND *
Youth literacy rate (% age 15-24), 1990	70.1
Youth literacy rate (% age 15-24), 2001	78.6

2.5.2 MDG2. Goal 3: Promote gender equality and empower women

Ratio of girls to boys, in primary education, 1990-91	0.77
Ratio of girls to boys, in primary education, 2000-01	0.83
Ratio of girls to boys, in secondary education, 2000-01	0.69
Ratio of girls to boys, in tertiary education, 2000-01	0.58
Ratio of literate females to males (age 15-24), 1990	0.76
Ratio of literate females to males (age 15-24), 2001	0.84

Female share of non-agricultural wage employment (%), 1990 ..	ND
Female share of non-agricultural wage employment (%), 2001 ..	ND *
Seats in parliament held by women (as % of total), 1990	6
Seats in parliament held by women (as % of total), 2003	23

2.5.3 MDG3. Goal 4: Reduce child mortality - Goal 5: Improve maternal health

Under-five mortality rate (per 1,000 live births), 1990	163
Under-five mortality rate (per 1,000 live births), 2001	100
Infant mortality rate (per 1,000 live births), 1990	120
Infant mortality rate (per 1,000 live births), 2001	87
One-year-olds fully immunized against measles (%), 1990	32
One-year-olds fully immunized against measles (%), 2001	50
Maternal mortality ratio (per 100,000 live births), 1995	650
Births attended by skilled health personnel (%), 1995-2001	21

2.5.4 MDG4. Goal 6: Combat HIV/AIDS, malaria and other diseases

HIV prevalence in pregnant women 15-24yr (%), major urban areas, 1999-2002	ND *
HIV prevalence in pregnant women 15-24yr (%), outside urban areas, 1999-2002	ND *
Condom use at last high-risk sex (% age 15-24), female, 1996-2002 ..	ND *
Condom use at last high-risk sex (% age 15-24), male, 1996-2002 ..	ND *
Orphans' school attendance rate as % of non-orphans', 1995-2001 ..	ND *
Malaria-related mortility rate (per 100,000), all ages, 2000	28
Malaria-related mortility rate (per 100,000), children aged 0-4, 2000	4
Malaria cases (per 100,000 people), 2000	759
Children under 5 with insecticide-treated bed nets (%), 1999-2002 ..	ND *
Children under 5 with fever treated with anti-malarial drugs (%), 1999-2002	ND *
Tuberculosis-related mortality rate (per 100,000 people), 2001	27
Tuberculosis cases (per 100,000 people), 2001	143
Tuberculosis cases detected under DOTS (%), 2001	40
Tuberculosis cases cured under DOTS (%), 2000	82

2.5.5 MDG6. Goal 7: Ensure environmental sustainability: water and sanitation

Population with sustainable access to an improved water source, rural (%), 1990 ..	ND
Population with sustainable access to an improved water source, rural (%), 2000	29
Population with sustainable access to an improved water source, urban, 1990 ..	ND
Population with sustainable access to an improved water source, urban, 2000	61
Urban population with access to improved sanitation (%), 1990 ..	ND

Urban population with access to improved sanitation (%), 2000	67

2.5.6 MDG10. Goal 8: Develop a global partnership for development: work opportunities, access to drugs and access to new technologies

Youth unemployment (% of labour force aged 15-24), total, 1990 ..	ND
Youth unemployment (% of labour force aged 15-24), total, 2001 ..	ND *
Youth unemployment (% of labour force aged 15-24), female, 1990 ..	ND
Youth unemployment (% of labour force aged 15-24), female, 2001 ..	ND *
Youth unemployment (% of labour force aged 15-24), male, 1990 ..	ND
Youth unemployment (% of labour force aged 15-24), male, 2001 ..	ND *
Population with sustainable access to affordable essential drugs (%), 1999	50-79
Telephone mainlines and cellular subscribers (per 100 people), 1990	0.2
Telephone mainlines and cellular subscribers (per 100 people), 2001	1.5
Internet users (per 100 people), 1990 ..	ND
Internet users (per 100 people), 2001	0.2
Personal computers in use (per 100 people), 1990 ..	ND
Personal computers in use (per 100 people), 2001	0.3

2.5.7 Millennium Development Targets for Lao PDR

Goal 1: eradicate extreme poverty and hunger			
Target 1: Halve between 1990 - 2015, the proportion of people living in poverty	***1990 Baseline***	***2015 Target***	*Lao national targets*
001a: Proportion of people living below the national poverty line	48%	24%	Lao National Target is to halve incidence of poverty by 2005 and to eradicate poverty by 2010 (note that this refers to the national poverty line). There is no national target on underweight in children, but there is a national target on malnutrition; to reduce by 40% of malnourished children by 2005
002: Poverty gap ratio (incidence times depth of poverty)	12%	6%	
003: Share of poorest quintile in national consumption	9.3% (1992)	Target under consideration by Lao Government	
Target 2: Halve between 1990-2015 the proportion of people who suffer from hunger			
004: Prevalence of underweight in children under five years of age	40%	20%	
005: Proportion of population below minimum level of dietary energy consumption	31%	16%	
Goal 2: Achieve universal primary education			
Target 3: Ensure that by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling			
006: Net enrolment in primary school	58% (1991)	98%	Lao National Target is to increase primary net enrolment rate to 80% (by 2000) and then to 85% (by 2005)
007: Proportion of pupils starting grade 1 who reach grade 5	47.7% (1991)	95%	
008: Literacy rate in the age group 15-24 years	78.5% (2001)	99%	Lao National Target is to Increase adult literacy rate (persons aged 15-40) to 85% (between 2001-2005)
Goal 3: Promote Gender Equality & Empowerment of Women			
Target 4: Eliminate gender disparity in primary & secondary education, preferably by 2005, & to all levels of education no later than 2015	***1990 Baseline***	***2015 Target***	*Lao national targets*
009: Ratio of girls to boys in primary, secondary, and tertiary education (number of girls per 100 boys enrolled)	62.2% (1991)	100%	Gender is among the four cross sectoral policy priorities in the NPEP. No specific national gender targets have been set except those in the MDG Report
010: Ratio of literate women to men, 15-24 years of age	81.5% (1995)	100%	
011: Share of women in wage employment in the non-agricultural sector	37.5% (1995)	Targets under consideration by Lao Government	
012: Proportion of seats held by women in the national parliament (percent)	6.3%		

Goal 4: Reduce Child Mortality			
Target 5: Reduce by two-thirds the under-five mortality rate			
013: Under-five mortality rate (deaths per 1,000 live births)	170	55	Lao National Target is to reduce U5MR to 100 per 1000 live births (by 2005) and then 30 per 1000 live births (by 2020).
014: Infant mortality rate (deaths per 1,000 live births)	134	45	Lao National Target is to reduce IMR to 75 per 1000 live births (by 2005) and then 20 per 1000 live births (by 2020).
015: Proportion of one-year old children immunized against measles	62% (1996)	90%	
Goal 5: Improve Maternal Health			
Target 6: Reduce by three quarters the maternal mortality ratio	*1990 Baseline*	*2015 Target*	*Lao national targets*
016: Maternal mortality ratio (deaths per 100,000 live births)	750	185	Lao National Target is to reduce maternal mortality rate to 355.5 per 100,000 live births (by 2005) and then 130 per 100,000 livebirths (by 2020).
016a: Contraceptive prevalence rate	13%	55%	increase the contraceptive prevalence to 35% (by 2005) and then 60-65% (by 2020)
017: Proportion of births attended by skilled health personnel	14% (1984).	80%	
Goal 6: Combat HIV/AIDS, Malaria and Other Diseases			
Target 7: Have halted by 2015, and begun to reverse, the spread of HIV/AIDS			
018a: HIV prevalence among 15-24 year old commercial service women	0.4% (2001)	<1%	Lao National Targets for HIV/AIDS were recently agreed to be aligned with MDG targets
019a: Proportion of 15-24 year old women who have ever used a condom during sexual intercourse	0.9% (1994)	20%	
019b: Proportion of 15-24 year old commercial service women reporting consistent use of condom with non-regular sexual partners in the past 12 months	44.7% (2000)	70%	
020a: Proportion of 15-24 year old women who know how to prevent RTIs/STDs	32.3% (2000)	70%	
020b: Proportion of 15-24 year old commercial service women who correctly identify ways of preventing sexual transmission of HIV and reject major misconceptions about HIV transmission or prevention	20% (2000)	70%	

Target 8: Have halted by 2015 & begun to reverse, the incidence of malaria & other major diseases	***1990 Baseline***	***2015 Target***	*Lao national targets*
021: Death rate associated with malaria (Deaths per 100,000)	9	0.2	
021a: Morbidity rate due to malaria (suspected cases per year per 1,000)	44	15	
022: Proportion of population in malaria risk areas using effective malaria prevention and treatment measures	23.9% (2000)	100%	
022a: Proportion of population in malaria risk areas protected by impregnated bed nets	25% (1999)	100%	
023: Prevalence rate associated with tuberculosis (per 100,000)	144	50	
024.1: Proportion of tuberculosis cases detected under directly observed treatment short course (DOTS)	24% (1999)	70%	
024.2: Proportion of tuberculosis cases cured under DOTS	72% (1996)	85%	

3. Environmental Policy, Legislative and Institutional Framework

3.1 Environmental policy and legislation

Laos has a comprehensive range of policies and laws governing environmental practice. Unfortunately, laws are only as effective as their implementation. This chapter examines the relevance of the environmental law as a deterrent to poor environmental practice and evaluates the effectiveness of the institutions responsible for law enforcement.

3.1.1 Environment Protection Policy and Law

The basic legal framework is laid down in the Environmental Protection Law of 1999, which was approved by an implementation decree in 2002. The law includes provisions for EIA for projects and activities that might have an impact on the environment, and regulations for all enterprises to control pollution and comply with environmental quality standards.

The executing agency is the Science, Technology and Environment Agency (STEA), which also is in charge of reviewing EIAs. STEA has developed specific guidelines for the content and process of environmental assessment of hydropower projects, including the preparation of environmental management plans.

The conservation of areas for biodiversity purposes has its legal basis in the Prime Ministers (PM) Decree of 1993 aimed at fulfilling the Lao PDR obligations under the Convention of Biological Diversity. Through this decree 20 National Biodiversity Conservation Areas (NBCAs) have been established, including the Nakai-Nam Theun NBCA. The administrative responsibility for the management of the NBCAs has been placed at the Ministry of Agriculture and Forestry (MAF).

3.1.2 Forestry Law

The Forestry Law of 1996 gives the general provision for management of all forest related resources, including all plants, wildlife, watercourses, etc. The Department of Forestry, Ministry of Agriculture and Forestry, has the overall responsibility. The Government of Lao PDR (GOL) is responsible for allocating the use of forestland and forest resources. Forests are grouped into the following five categories: Protection, Conservation, Production, Regeneration, and Degraded, each with their specific management policy.

3.1.3 Water Management

The Law on Water and Water Resources of 1996 is intended to assure sustainable use of water. Water use is categorised into small, medium and large-scale use. The legislation

prescribes the rights and permit procedures for the different categories of water use. The development of large-scale user projects requires the preparation of an EIA. The administration of the Water Law is located in the Water Resources Co-ordination Committee under the Prime Ministers Office.

3.1.4 Resettlement Policy and Regulation

A Draft National Resettlement Policy was issued by GOL in 1997. The principles of this policy has been included in the Electricity Law, the Water Law and the Road Law, all of which now require developers to provide the affected people with compensation and/or replacement for lost land. A set of regulations for preparing and implementing involuntary relocation programmes has been issued. In addition to the draft resettlement policy and regulation, a Decree on Resettlement and Compensation was issued in June 2004. The Decree aims at:

- helping integrating social dimensions and mitigation measures into development projects with special focus on vulnerable groups;
- ensuring that provisions for mitigation measures in other applicable laws, decrees and the national policy on resettlement and compensation are adhered to, and;
- ensuring that the project affected population share in the benefits of the development project and that their livelihoods and living standards are restored to at least pre-project level.

Land Ownership and Land Use Rights

Most of the agricultural land in Lao PDR is still held through traditional and customary rights but there are ongoing initiatives both in the form of the World Bank supported "Land Titling Project" and the "Land and Forest Allocation Program" of the Ministry of Agriculture and Forestry that is providing an increasing number of farmers with land titles and legal deeds to their land.

The legal basis for land use and land ownership is provided in the Land Law of 1996 and Land Decree No. 99. In principle the State owns all land but long term occupancy and utilisation rights for individuals are recognised.

3.2 Other domestic legislation with environmental components

Other natural environment laws which are supported by presidential decrees are

- Road law (1999)
- Land law (1997)
- Mining law (1997)
- Agriculture law (1998)

3.3 International commitments

There are several important International Commitments.

3.3.1 Mekong River Commission and Mekong Basin agreements

Lao PDR is one of the four signatory parties to the 1995 Agreement on the Co-operation for Sustainable Development of the Mekong River Basin and one of the members of the Mekong River Commission (MRC). The Commission succeeded the Mekong Committee, which, among other things, was instrumental in the planning of Nam Ngum, the first larger hydropower project in Lao PDR. Whereas the Committee was primarily focussed on hydrology, navigation and hydropower, the mandate of the Commission is more oriented towards co-operation for the promotion of sustainable development, utilisation, management and conservation of the water and related resources of the Mekong River Basin.
The primary purpose of the Agreement is to promote economic and social well-being of the people in all the riparian countries through the protection of the environment, improvement of navigation and the co-operation in the maintenance of flows and intra-and inter-basins diversions. MRC has initiated several basin-wide planning and research programmes, including the Water Utilisation Plan (WUP), the Environmental Programme (EP), the Basin Development Plan (BDP) and the Fisheries Programme. Lao PDR has its own National Mekong Secretariat in Vientiane.

3.3.2 ASEAN Membership

Lao PDR became a member of the Association of Southeast Asian Nations (ASEAN) in 1997. ASEAN countries have adopted an agreement on the Conservation of Nature and Natural Resources. However, this agreement has been ratified by only three countries since it was adopted in 1985, and is therefore not in force. ASEAN also has provisions to assist member countries to establish transboundary nature reserves.

3.3.3 Greater Mekong Sub-region (GMS) initiative

In 1992, with the assistance of ADB, Cambodia, Lao People's Democratic Republic, Myanmar, Thailand, Viet Nam, and Yunnan Province in the People's Republic of China entered into a program of sub-regional economic cooperation, designed to enhance economic relations among the countries. The program has contributed to infrastructure development and better use of the resource base in the sub-region.

3.4 International Conventions and Treaties

Laos is participating in the following conventions:

Convention on Biological Diversity (CDB)
Lao PDR became a signatory to the CDB in 1992, following up the ASEAN Agreement of the Conservation of Nature and Natural Resources, which was signed in 1985. The obligations of CDB have been fulfilled in terms of new policy and legislation and by establishing NBCAs.

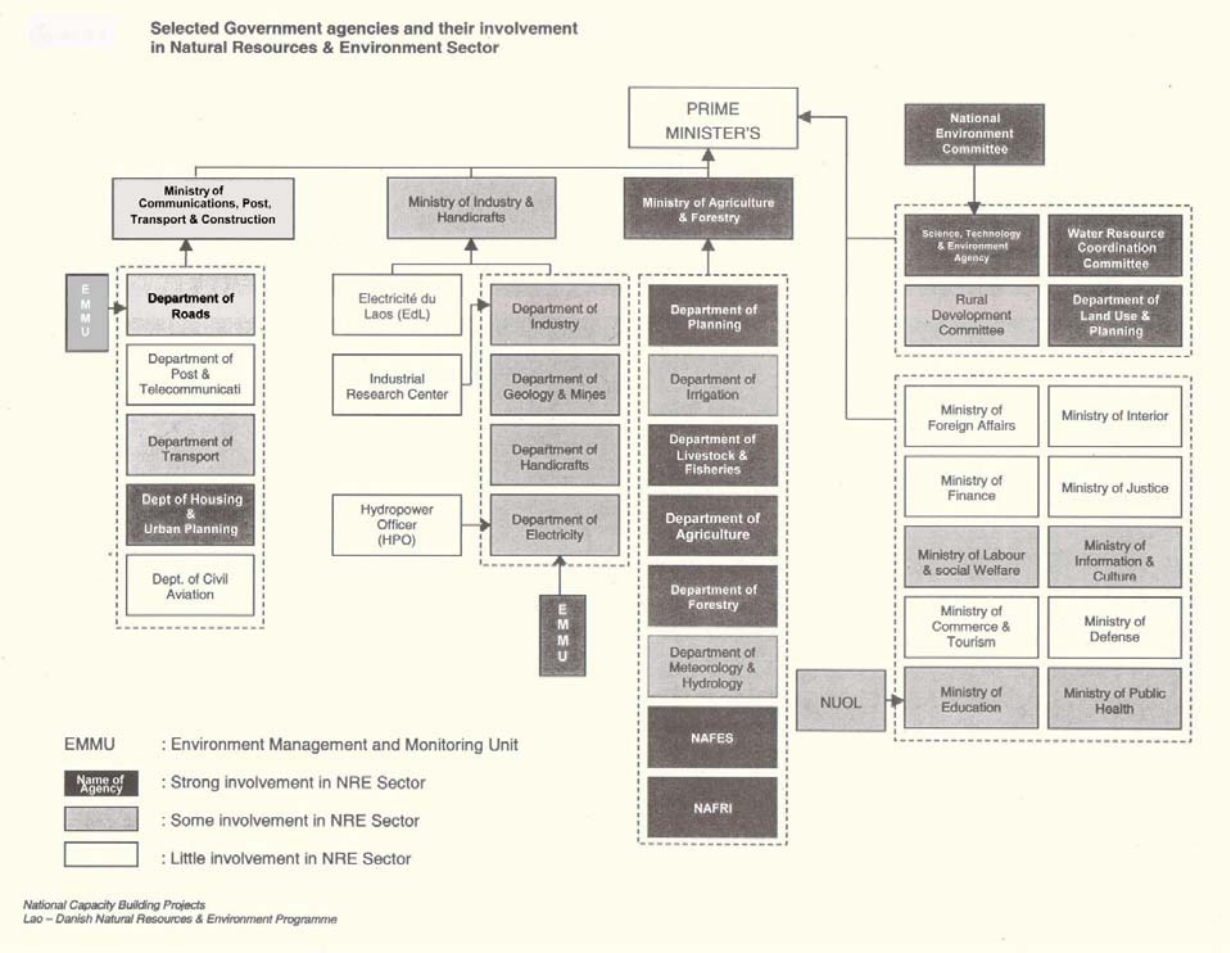
Convention on International Trade in Endangered species (CITES)
Lao PDR ratified this convention in early 2004. Prior to the ratification, the Ministry of Agriculture and Forestry (MAF) issued a regulation that banned all hunting for trade. Hunting for consumption was still allowed. This is a signal that GOL is now committed to increasing efforts to halt the extensive trade in wildlife from Lao PDR to its neighbouring countries.
In addition Laos is participating the other Conventions which are listed here:

- ***United Nations Framework Convention on Climate Change 1992***
- ***Vienna Convention on the Protection of the Ozone Layer 1985***
- ***Convention for the Protection of World Cultural and Natural Heritage 1972***
- ***Convention on International Trade in Endangered Species of Flora and Fauna (CITES, 1973)***
- ***Wetlands of International Importance Especially as Waterfowl Habitat (RAMSAR, 1971)***

3.5 Environmental institutional framework

3.5.1 Over-view

This section describes the institutional framework mandated to protect the environment and evaluates their overall effectiveness in environmental protection. The key players and frameworks are described below:



The cross-sectoral nature of environment and natural resources issues indicates that various ministries and agencies should be involved including STEA, the National Environment Committee (NEC), Water Resources Coordinating Committee (WRCC), Ministry of Communication, Transport and Post and Construction (MCTPC) and the Ministry of Agriculture and Forestry (MAF). Agencies with secondary environmental responsibility include the Leading Committee for Rural Development and the Department of Land Use Planning & Development, both of whom report to the Prime Ministers Office. To ensure effective management of environmental issues the Environmental Protection law stipulates that Environmental Management & Monitoring Units (EMMU) are formed to support sector agencies in their activities. EMMUs have not been established in MAF and those that have been established are largely ineffective.

3.5.2 Science Technology and Environment Agency (STEA)

STEA is an agency of the Prime Ministers Office and has overall responsibility for environmental affairs. STEA undertakes macro-level environmental management leaving line ministries the responsibility for their own environmental management. In effect this reduces the mandate of STEA to such an extent that it has little or no control over the environmental practice of line ministries. STEA is under-resourced and capacity and capability is weak. The wide and comprehensive mandate of STEA is to:

- Co-ordinate, consult and assess environmental issues
- Formulate environment management regulations and guidelines
- Ensure that development line ministries adhere to environmental guidelines
- Develop and direct public awareness programmes
- Co-ordinate collection of data on natural resources
- Monitor and control implementation of strategies, plans, programmes and laws relating to the environment
- Establish and operate a system of compliance and monitoring in accordance with environmental codes
- Instruct development projects to prepare environmental assessment reports

This mandate is simply not possible given the weak authority of STEA and the absence of political will to enforce the rule of law.

3.5.3 National Environment Committee (NEC)

The newly formed NEC is intended to facilitate the ongoing development of an environmental policy framework for Laos. The NEC was created by Presidential decree in 2002. The role of the committee is to:

- Co-ordinate the development of environmental management and monitoring plans of sectoral agencies
- Advise the Government on management, protection and inspection of the environment
- Propose views regarding strategy, regulation and guidelines related to the environment
- Research mitigation methods for problem solving in the environment sector.

Similar co-ordination committees exist for the water, transport, industry and agriculture and forestry ministries. The effectiveness of all coordination committees is hindered by a lack of respect for and enforcement of the rule of law relating to environmental practice.

3.5.4 Regional and other framework initiatives

A number of additional regional frameworks exist that attempt to co-ordinate environmental practice across the region are described below.

Asian Development Bank Strategic Environmental Framework in the Greater Mekong Sub region

In 1992 the six countries that share the Mekong river entered into a programme of sub-regional economic co-operation. At the same time a Strategic Environmental Framework was established to ensure environmental and social sustainability and protection especially within the energy, water and transport sectors.

Environmental Impact Assessment and Assessment Systems Guidelines for the Lower Mekong basin

The MRC is developing an EIA system for projects and a Strategic Environmental Assessment System (SEA) for policies, plans and programmes. It is proposed to integrate the IA/SEA system into the basin development plan of the MRC.

The EIA/SEA system will focus on water resource programmes and projects undertaken in participating MRC countries (Cambodia, Laos, Thailand and Vietnam) that have the potential to cause transboundary impacts.. The types of developments to be addressed by this system include hydropower dams, inland navigation, ports and harbours, agriculture, irrigation and flood management.

Environmental Guidelines

A number of environment guidelines have been prepared by international donors and international finance institutions, such as ADB, WB, EC, OECD to guide and ensure best practice during project implementation. Seminal guidelines include the following:

- Environmental Assessment Requirements of the ADB, 1998
- Environmental Assessment Sourcebook, WB, 1991
- Environment Manual, EC 1993
- Environmental Guidelines for UNCDF Project Cycle, UNCDF 1993
- Guidelines on Environment and Aid, OECD 1992.

4. EU and other Donor Co-operation

Within the last 10 years Laos has been the recipient of substantial development aid from multilateral and bilateral aid agencies. Since 2000, the level of aid has dramatically increased with the environment, health and infrastructure sectors receiving very substantial support. Within the last five years the EC and ADB have established Delegations in Vientiane and the MRC Secretariat moved from Cambodia to Laos in 2004. Key international NGOS, namely IUCN and World Wildlife Fund (WWF) also enjoy a high profile presence in Vientiane. This section describes the important recent and on-going environment development projects funded by the principal aid agencies and assesses their direct impact upon environmental mitigation as well as their cross-cutting relevance and impact upon poverty, health and general development.

4.1 EU international initiatives

Forest Law Enforcement Governance & Trade (FLEGT),

This is an Action Plan for Forest Law Enforcement, Governance and Trade, and sets out a process and a package of measures through which the European Commission proposes to address the growing problem of illegal logging and related trade. Addressing this issue is one of the European Commission's priorities in the follow-up to the 2002 World Summit on Sustainable Development (WSSD).

The Action Plan is the start of a process which places particular emphasis on governance reforms and capacity building, supported by actions aimed at developing multilateral cooperation and complementary demand-side measures designed to reduce the consumption of illegally harvested timber1 in the EU (and ultimately major consumer markets elsewhere in the world).

Biodiversity Action Plan

The Biodiversity Action Plan builds on the objectives of the EC Biodiversity Strategy, and considers how they can be achieved in the context of the international development targets. Two development targets are of particular relevance: the development of national strategies for sustainable development, so as to reverse the loss of environmental resources by 2015; and the reduction of poverty by half by 2015. The aims of the biodiversity action plan are to identify priority actions that will address the objectives of the *Biodiversity Strategy*, incorporating actions already noted in the *Biodiversity Strategy*; to identify priority actions for integrating biodiversity into the policies, programmes and projects being developed and funded through EC economic and development co-operation; to identify actions that help to build the European Commission's capacity to address biodiversity issues as part of economic and development co-operation.

4.2 Regional initiatives

Regional (basin-wide) initiatives by the Mekong River Commission and other Basin riparians, and under the wider scope of ASEAN, have been noted in Section 3.3.

4.3 EU Projects in Laos

The EU is one of the most active donors of development, humanitarian and trade assistance to Laos. There are 25 ongoing EC projects amounting to a total of Euro 60.7 million. Rural development makes up two-thirds of the EC project portfolio. The overriding goal of EC assistance to Laos is rural poverty reduction, implemented through integrated rural development projects. Examples include the integrated rural development projects in Luang Prabang, Luang Nam Tha and the micro-project initiative in Vientiane and neighboring provinces. These projects have worked at village level and have provided physical and social infrastructure to poor areas. The Forestry Conservation and Rural Development Project in Phongsaly has made an even greater impact upon environment issues through protection of forest resources in an area of Laos threatened by rampant development from Chinese interests in Yunnan province. The EU also recognises the importance of aquatic resources and has implemented a wetlands protection project in the Siphandone Wetlands in Champassak.

Environmental protection of the urban environment has been addressed through a number of projects including the Vientiane Flood Plain Protection project and health projects. In addition, the EC supports a project to strengthen livestock services and funds European NGO-implemented projects to improve the food security of vulnerable populations. A 10 million Euro project entitled 'Microprojects Development through Local Communities' will cover, from 2002, small scale infrastructure and training in two districts of Luang Prabang Province and two districts of Luang Namtha Province.

In the *health* sector, the EC supports two projects, which are implemented by the Ministry of Health: a malaria control programme (part of a regional programme including Cambodia and Vietnam) and a project aimed at care and prevention of sexually transmitted diseases. The Malaria control programme is active in seven provinces, and supports capacity building activities in the prevention and treatment of malaria as well as the distribution of impregnated bed-nets. The EC also supports reproductive health activities through a regional programme implemented by the United Nations Family Planning Association (UNFPA) and NGO-implemented health projects through the NGO co-financing budget line.

4.4 Other Donors

4.4.1 Japan

Japan is the main donor to Lao PDR, and has been particularly active in supporting the education, transport, agriculture and water supply sectors as well as in providing macroeconomic assistance. Support to the environment sector is through the Forest Management and Community Support Project (FORCOM) and through substantial support to the Ministry of Agriculture and Forestry during preparation of the Forestry Strategy to the Year 2020. In April 2004, the Japanese aid agency JICA prepared guidelines for environmental and social considerations to be applied during the planning stage of development projects in Laos.

4.4.2 Asian Development Bank

The ADB continues to provide a wide range of development projects through it's lending programmed. ADB support to the GMS programme of regional development through the construction of transnational roads and other infrastructure is accompanied by careful EIA to assure that development corridors are provided adequate environmental protection, particularly for biodiversity conservation.

The most important and significant environmental project is the Forest Plantation for Livelihood Improvement Project (formally tree plantation for livelihood improvement project). This project, which is now in it's second phase, will provide support to smallholder farmers wishing to establish fast growing forest plantations in support of growing markets for pulpwood and other forest industry raw material requirements.

4.4.3 World Bank

The World Bank (WB) continues to provide substantial assistance for larger scale transport and energy infrastructure projects, but is also active in rural development, health and education sectors. Two initiatives are of particular interest to the environment sector. First, the Sustainable Forestry Rural Development Project (SUFORD) which aims to develop protocols and best practice in low intensity sustainable logging of community managed natural forest and equitable distribution of income from harvested products. This project follows the FORMACOP FINNIDA funded project and is a welcome initiative since it recognised the importance of respecting community involvement in natural resource planning and management.

Second, the creation of an Environmental Protection Fund as an umbrella fund for the implementation of project initiatives identified and prepared by the Government of Lao. Initial tranches of 5 million USD and 4 million USD have been granted by the ADB and

WB respectively and will fund policy development (capacity building, policy development in EIA, hydropower strategy, resettlement policy and public awareness building) and investment needs within the environment sector (protected areas management, livelihood options and provincial and district level planning). The fund will provide cash to STEA to facilitate the solid implementation of their environmental strategy and action plan.

4.4.4 UNDP

The UNDP is implementing a suite of development projects in various sectors, including environment. Two projects are of particular significance to environmental management . First a Governance programme in STEA aimed at introducing clean and accountable governance through attention to clear and transparent financial management, development of the concept of adhesion to the rule of law, and improvement in public service. These issues relate to the accountability and responsibility of Government officers generally but also have relevance to the behavior of Government staff involved in regulation and enforcement of environmental law.
The second initiative is a joint UNDP/MRC Environmental Governance project which aims to strengthen the capacity of the National Mekong Committees in the four member countries. Given the importance of regional cooperation in tackling environmental issues, this initiative is clearly useful.

4.4.5 FAO

FAO has a wide range of projects and activities throughout the country. Generally the project approach is designed to deal with small-scale local issues, and with specific health sector initiatives. Under the National Integrated Pest Management Programme FAO funds training activities for vegetable and rice culture and pest management whilst it also supports the Non-Wood Forest Marketing Project (NWFP), various aquaculture development and training programmes, including fish/rice aquaculture, and in the field of veterinary medicine. On the wider scale, its activities include land use mapping and the provision of emergency assistance in controlling the incidence of avian influenza.

4.4.6 SIDA

The Swedish Development Agency has two on-going projects of significant importance to the environment sector. The Lao-Swedish Forestry Programme, which has been operational for many years, has contributed to Provincial natural resources management (PRONAM) and has also strengthened the development of National protected areas management. The programme has now grown into the Lao-Swedish Upland Agriculture & Forestry Research

Programme that is making important contributions to the development of policy for upland land management including watershed management and stabilization of shifting cultivation. The other significant project, Strengthening Environment Management through cooperation with STEA, aims to strengthen the mandate and authority of STEA through institutional strengthening and capacity building. The project is also placing importance on EIA, environmental awareness education, environmental strategy formulation and training. The project recognizes the weakness of STEA as a Government agency responsible for enforcement of environmental law.

4.4.7 IUCN

The IUCN programme of activities in Laos started with a primary focus on protected area planning and management of biodiversity within the 20 NBCA areas. Some of the donors who had supported projects in the NBCAs have now ceased funding of these activities and this has led the Government of Lao to slightly neglect the importance of protected areas. IUCN now addresses a wide range of natural resources management and sustainable development issues at both field and central planning levels. The IUCN programme is currently concerned with the sustainable use of NTFPs, the management of forest and wetland ecosystems, the implementation of the Convention on Biological Diversity (CBD), participatory protected area management and EIA of planned infrastructure projects. IUCN woks with a range of donors and continues to provide an important environmental monitoring service to Laos.

4.4.8 Other NGOs

There are many other NGOs active in the environment sector in Laos. The notable ones are the WWF, WCS and TRAFFIC. These NGOs are concerned primarily with biodiversity conservation. TRAFFIC is concerned with the illegal export of animal parts and live animals to neighboring countries, mainly China and Vietnam. In the health sector, several Red Cross/Red Crescent Agencies, Medicines Sans Frontieres and others are active in the field. The Mines Action group and other clearance organisations are also important in the rehabilitation of remote areas rendered unsafe because of unexploded ordnance (UXOs).

4.5 EU Member States programmes

Germany, Sweden and France are the main EU bilateral donors to Lao PDR. Belgium, Denmark, Finland, the Netherlands, and the United Kingdom have also provided development assistance. All EU member states providing direct assistance to Lao PDR have supported actions targeted on human resources development and better public administration, Germany has supported vocational training and rural development, Sweden has supported roads, forestry, and water supply development, and France has supported health, rural and urban development.

4.6 Private sector

Private sector companies engaged in the exploitation and processing of natural resources in Laos generally try to maximise profit in the short term. This implies unsustainable resource extraction and a disregard of environmental best practice and law. A notable exception is the Burapha Group which is a long established company, now involved in the manufacture and export of furniture from plantation grown Eucalyptus plantations around Vientiane. Burapha employs around 100 persons in it's forestry and sawmill operations and complies with environmental law. Apart from it's own plantations, Burapha also sources wood private growers. The operation is both environmentally sustainable and observes best practice to protect the environment. Moreover, the example of Burapha is a clear indication that huge potential exists for small scale private plantation development in support of forest industry.

4.7 Impacts of projects and lessons learned

In general, EC-Lao PDR projects have targeted poorer areas, especially in the north of Lao PDR. The projects have implemented a broad range of activities relevant to the local development needs. The individual micro-projects have been selected and adapted according to local community's demands, and are often planned, implemented and operated with a high level of village participation. Projects have been particularly successful in providing physical and social infrastructure in remote areas, which has improved access to markets, and education and health services. For example, the district roads constructed in Luang Prabang province have had a major impact and have created market opportunities in areas that were previously left out of development possibilities.

EC assistance to Lao PDR has engendered better mutual understanding and collaboration with Lao PDR national and local authorities. This process is extremely important to build the capacity of local counterparts, to create a sense of national 'ownership' of projects, and to facilitate the sustainability of project activities.

An important positive impact of EC projects has been the increasing use and acceptance of local private contractors. Whenever possible, EC projects have tendered out infrastructure works to private companies and contributed to on-site training and supervision. There are now more contractors willing and capable to tender and carry out public contracts in projects areas to a satisfactory standard. Moreover, the willingness and the capacity of local public agencies to work with the private sector have been increased.

Another noteworthy aspect is the establishment of a sizeable collaboration programme with European NGOs operating in Lao PDR in the health, humanitarian assistance and food security sectors. Ongoing projects implemented by NGOs amount to Euro 11 million, or 18% of the present portfolio. In general, the experience has been positive, and NGOs have proven to be a cost-effective means to target assistance, especially in the social sectors, with a good level of community participation. However, there are restrictions on NGO operations in Lao PDR: independent national NGOs are not operating, and international NGOs are subject to a strict government control.

The decision to pursue a multifaceted project approach reflects a recognition that rural livelihoods are very complex and depend on numerous interrelated factors. However, a problem experienced in some EC-Lao PDR projects has been that the original project design has been too ambitious. Project proposals have sometimes contained too many objectives covering too large areas. It is important for the EC as well as for the Lao PDR authorities to have realistic expectations about the results that can be achieved in the Lao PDR context, where the project areas are often remote and the capacity of government agencies is weak. The problem has been further compounded by the higher priority given, by the central Government to larger infrastructure works, often beyond local district capacity. Future projects need to have a simpler design and focus on well-defined activities that are most critical for poverty reduction and with clearly established financial ceilings per intervention.

The EC has gained considerable experience in providing physical and social infrastructure. One of the main lessons learned is that small scale, low cost infrastructure (for example, horse tracks, secondary roads, small scale irrigation) is often most suitable for rural Lao PDR. Small to medium scale infrastructure has several advantages, including cost effectiveness, simpler operational and maintenance and greater relevance to poverty reduction in remote, upland areas. It is therefore important to avoid large scale infrastructure projects and, in any event, the existence of adequate operation and maintenance arrangements, at technical and financial level, must be a criterion prior to any financing decision.

In the past it can be noted that the EC has, with the aim of reaching as many beneficiaries as possible, tended to spread assistance too thinly and widely, thereby making it difficult to manage it well and reducing its impact. This has encouraged the development of a more programmed approach, restricting future activities to pre-identified key sectors. The policy to support fewer but larger programmes is already being implemented and will be reinforced in the future.

Another important lesson from past EC-Lao PDR co-operation is the need for a long-standing technical assistance in the field to obtain good results, due to problems related to the remoteness of many of the project areas and to the time it takes to build up local confidence and capacity. It is therefore important to locate the technical assistance close to counterparts and beneficiaries, even at the district level.

Experience has also shown that donor-funded projects, including EC projects, need to give greater attention to the issue of sustainability. Under pressure to deliver physical infrastructure, projects have often had a limited impact on strengthening the capacity of local counterparts. It is therefore important that this challenging process of capacity building is tackled as a priority at the start of the project period, and that the pace of actual implementation is made dependent on local capacity levels.

4.8 Summary of selected recent and current key donor-supported environmental projects.

Project	Activities	Donor	Stage/Duration
Strengthening Environment Management through STEA	Good governance Institutional support EIA Environmental education and strategy	SIDA	Phase II 2005-2010
Lao-Swedish Upland Agriculture & Forestry Research Programme	Stabilisation of shifting Cultivation	SIDA	
Phongsaly Forest Conservation & Rural Development	Forest conservation and Rural development	EU	2000-2005
Sustainable Forestry and Rural Development (SUFORD)	Sustainable exploitation of community forest & equitable sharing of income within communi	WB	2003-2007
Environmental Governance programme	Strengthen capacity of National Mekong committees Develop country specific strategies	UNDP/MR(	New project
Environmental Protection Fund	No details	WB	New project
Forest Plantation for Livelihood Improvement Project	No details	ADB, EU	Second phase 2005-2010

4.9 Donor comments on project experience and issues arising from them

DONOR/ AGENCY	PROJECT/ ACTIVITY	ISSUE
ADB	Range of grant and loan investment projects	Forest plantation for livelihood projects (phases I and II) has catalyzed the development of private plantation development in Laos. This provides important livelihood options for entreprenurial farmers. Good markets for plantation grown wood in furniture, construction and pulp forest industry sectors.
STEA	Government of Laos environment agency	STEA recognizes the need for good governance and for government staff in ministries and environment agencies to have clear roles and responsibilities and to be accountable for actions.
WB	Range of development projects	The Environmental Protection fund (funding from WB and ADB) is an important umbrella fund for GoL to support national environmental initiatives. Two key activity groups are policy development and investment. It is hoped this fund will give impetus and authority to the activities of STEA
MRC	Mekong wide regional initiatives	Laos continues to provide environmental goods and services to the Mekong river and delta. Deforestation is not yet so severe as to significantly reduce watershed protection functions or habitat for major biodiversity. Yet, foreign investment and national development programmes threaten the long term sustainability of environmental integrity unless guidelines and laws are upheld. Fisheries development and hydrology initiatives are a priority in view of rapidly changing conditions affecting these sectors
JICA	Range of development projects	JICA has played an important role in the Department of Forestry, especially with regard to support for the preparation of the Forestry Strategy by the Ministry of Agriculture and Forestry, and in the preparation of environmental guidelines.
ECOLAO	Consultancy firm	ECOLAO made important contributions to the Cumulative Impact Assessment Report of the Nam Theun 2 Hydropower Project and in so doing led the debate on the importance of sustained yield management of the forests of Laos.
Burapha	Private Eucalyptus plantation forestry integrated with furniture manufacture for domestic and export markets.	Long term sustained yield private forestry provides a good opportunity for sustainable livelihoods for smallholder farmers to produce and sell fast growing exotic forest plantations to the furniture, pulp and other forest industry in Laos

DONOR/ AGENCY	PROJECT/ ACTIVITY	ISSUE
SIDA/ Ramboll Natura	Strengthening Environment Management through STEA	This project, along with the UNDP support to the Governance and Public Administration Reform Project recognizes the institutional weakness and poor capacity of Government of Laos Institutions and Ministries. STEA has a large environmental protection mandate yet has insufficient financial and human resources to meet the challenge. The SIDA supported project represents an important step towards institutional support and reform.
Red Cross	Rural health programmes, HIV/AIDS	Ongoing programmes, esp. in women's health education, HIV/AIDS education and awareness etc. Major problem is shortage of trained Lao field staff and poor funding and support of facilities outside major towns.

5. Conclusions and Recommendations

This Chapter reviews the principle issues that are relevant to environmental (and by implication, social) strategic planning. Whilst many issues have been identified during the mission to prepare this Profile, the central cause for concern is the dramatic challenges facing the most important dynamic system that regulates environmental stability in Laos, that forest ecosystem. There is an adequate legislative infrastructure in place that should permit state management and regulation of many of the problem areas. But in practice, the complete absence of effective enforcement capacity, exacerbated by the involvement of government and state agencies such as the police and army in violations of the regulations, means that environmental resource exploitation and damage are out of control. Strategic planning must address this issue as its primary objective if any future assistance to the country is to be valid.

5.1 Main issues

The main environmental issue is the very high degree of reliance or the overwhelming proportion of the population on natural resources, dictating an immediate necessity to mainstream environmental issues in future strategic planning for investment and aid for the country. Recent trends in population changes and resource exploitation have led to an extremely rapid destabilisation of the natural resource base of the country by

- Overcutting of natural forest and export of logs to China, Thailand, Vietnam and Cambodia
- Some loss of watershed function in logged upland areas
- New areas opened up through shifting cultivation and shortening rotation cycles
- Illegal export of protected animal and plant species to neighbouring countries
- Increased in-migration to urban areas, leading to increasing urban pollution (air and noise in Vientiane) and the decline in family structures in rural areas
-

As a result, social structures are coming under increasing pressures, with increasing pressures on urban centres to absorb and provide facilities for migrant workers. The growth of sectors servicing the new tourism industry has led to dramatic changes in employment opportunities in Vientaine and some other provincial centres, but also to an increased need for health sector vigilance.

The issues raised by these recent trends are exacerbate by:

- Very weak Government level coordination of Ministries and other stakeholders involved in land management
- Very weak enforcement of environmental law by STEA
- Poor education, health and welfare service capacity

In the following sections, the main issues arising from the above concerns are briefly summarised, and recommendations provided for addressing them.

5.2 State of the Environment

5.2.1 Over-view

Environmental issues are at the centre of the welfare of over 80% of the population of Laos. For a large proportion of these, current adverse or degenerative environmental trends directly threaten their livelihoods and welfare. For some, this may be critical – for example, forest-dwelling people or fishing communities, who rely almost entirely on their access to natural resources for both subsistence and trading. For others, such as agriculturalists in the lowlands, and for the increasing number of urban dwellers, it may represent a decline in availability of part of their resource base, but one that can be tolerated, at least to a great extent.

Although there has been a strong movement towards establishing an adequate set of legislative and other administrative frameworks that are aimed at regulating the management of both social and environmental processes that govern how natural resources may be exploited in Laos, there has not been an accompanying strengthening of regulatory and enforcement capacity that would support any attempt to impose control on what is, at present, an out-of-control situation.

5.2.2 Growth of large-scale environmental degradation.

Approximately 80 percent of the population of Laos depends upon the daily exploitation of natural resources for at least part of their livelihood. The small population of around 5.8 million persons and relatively difficult access to natural resources (due to the largely mountainous terrain and poor infrastructure of Laos) has resulted in relatively modest resource extraction up until now. However, whilst natural resource utilisation was in the past almost exclusively an essentially locally-based subsistence activity, this has changed dramatically in recent years, with the development of large-scale organised depredations on natural resources, regardless of the core issue of their sustainability.

The key resource in Laos is the forest. Whilst it probably now provides a far smaller proportion of the resource base upon which much of the population depend than in former times, the stability of the physical structure of the land and water environments are directly dependent upon the state of the forest cover in both the highland and lowland regions of the country. The abrupt decline in forest cover in recent years, down from around 47% in 1990 to nearer 34% now – indicates that forest cover is declining at an astonishing rate, presenting a profoundly adverse threat to the integrity of the physical stability of the country.

The highland forest cover exists mainly on land that is unsuitable for any but the most basic form of agriculture. Swidden ('slash and burn' agriculture), when carried out at low intensity is entirely sustainable – indeed, it is responsible for providing greater habitat diversity within the forests, and therefore actually promotes a higher degree of biodiversity than unbroken forest alone.

But increasing population pressure in the highlands has forced established swidden farmers to migrate to steeper terrain, and to increase the intensity of cultivation. At the same time, large-scale depredations by state-backed and external criminal interests in commercial logging in both highland and lowland zones has reduced forest cover throughout the country. Consequently, large areas of steep hillsides are eroding, increasing sediment loading in tributaries and accelerating its deposition in lowland areas. The latter increases the threat of localised flash flooding and consequently damages lowland agricultural activities and river fisheries.

In parallel with this destructive trend, there has been an ill-considered rush to develop hydropower, so that electricity can be exported to richer neighbouring states. Despite claims that hydropower is a 'green and sustainable' form of energy, it is a leading source of environmental damage in Laos, and its adverse impacts will increase substantially in the future. Hydropower storage dams trap sediments mobilised from denuded upstream catchments, and their effective life-span is reduced. Lucrative large-scale logging concessions in the proposed reservoir areas legally avoid the nation-wide ban on logging.

This has led to deliberate and cynical exploitation of the current weakness in the regulation of environmental issues in hydropower development project areas. Manifestly absurd and impractical schemes are proposed, designed (on paper, at least) so that the reservoir would cover the greatest possible area of valuable stands of timber. Immediately a Memorandum of Understanding has been signed, there is a rush to extract the best timber, even if the actual prospect of completing the scheme is effectively zero. For example, the Xe Kaman 1 project would take seven years for the proposed reservoir to fill, and if any attempt were made to commence generating before that time, then the reservoir would never actually fill – there simply is not enough run-off upstream. But long before the project was adopted, predatory loggers were displacing local communities and raiding this formerly isolated and undamaged watershed.

These large power-generating projects invariably have devastating effects on local fisheries, and may even damage this sector on a Basin-wide scale once the cumulative impacts of multiple schemes are taken into consideration.

A recent sectoral development now also threatens the physical integrity of the region. This is the development of mines for gold and toxic metals such as copper and zinc. In these schemes, large areas of land will be permanently destroyed and lost to local communities. Huge quantities of potentially toxic waste, containing metals at levels too low for processing to be commercially attractive will be dumped, with a high risk of toxic leachate draining to ground and surface waters. In some cases extremely dangerous chemicals, such as cyanide,

are used on a large scale; without the essential State capacity effectively to monitor and regulate the activities of these purely commercial operations the risk of severe environmental damage on a wide scale must be regarded as high.

5.2.3 Dissipation of natural resources to neighboring countries

In Laos, maintaining the environmental equilibrium of almost the entire country is directly dependent upon retaining as much of the forest and vegetative cover as possible. For this reason we contend that forest is the most important natural resource in Laos, as the effects of forest cover regulate the principle environmental processes within the country and the entire Basin.

However, Laos is surrounded by resource poor (but economically richer) countries especially Thailand, Vietnam and China, where large long-term markets exist for a wide range of forest products, including those that are severely endangered or even actively banned from exploitation. The lack of institutional capacity and authority of environmental institutions in Laos, principally STEA, and consequent weak (or even total absence of) enforcement of the environmental legislation is a critical obstacle to future resource conservation. It has resulted in large scale unsustainable logging of the forest lowlands and export of logs to these countries, much of it supported by the army, Government of Laos and others with vested interests. The political will to clamp down on, what is effectively, illegal logging and resource plundering is obviously very weak.

The pressures on all natural resources will increase as Laos undergoes economic development. Internal development will promote the continued logging of natural forest resources, the export of endangered species and scarce biological commodities, mining for copper and gold and continued land degradation from shifting cultivation.

In the regional context, increasing incursion of Chinese and the opening up of vast areas of presently inaccessible wild-lands in Laos and along the Lao-Vietnamese border by trans-national road networks between Thailand, China and Cambodia, will constitute a severe threat to both forest timber reserves ad to endangered wildlife.

Evidence exists of overseas investors seeking and gaining logging concessions in Laos. Chinese Malaysian, Korean and other investors are rapidly stripping out forests on the pretext of downstream investment through land conversion to oil palm, rubber and other tree crops. Yet, long term commitment to tree crop production by foreign “investors” has so far been a hollow promise. Forest utilisation has essentially become a ‘resource mining’ operation, in which a potentially sustainable resource is being eliminated for a one-off private gain.

5.2.4 Transitional effects in the rural areas.

As the rural environment becomes degraded through unregulated development, pressures on young people to migrate, either as families or as bread-winners, to urban centres is increasing. This has important implications for social welfare, as family ties become looser. For the elderly, and for mentally disabled people, this is an increasing problem, as the traditional system for supporting those within a family who are economically incapacitated weakens. The absence of effective physical and mental health-care provisions in rural areas is particularly threatening to such people, and much more support needs to be included in future policies for managing social issues in rural areas.

Many upland farmers rely increasingly on cash crops to supplement their standard of living. Unfortunately, recent attempts to eliminate poppy growing in the Northern Highlands have merely eliminated an essential source of income without replacing it with more acceptable cash crops. Consequently, some communities are now worse off than before, and both social and economic conditions have declined even further. There is an urgent need for integrated cross-sectoral planning in these areas, with a need for both social services and for appropriate infrastructural development (small local all-weather roads, better markets, and transport) to improve the economic welfare of these deprived communities.

5.2.5 The urban environment

In-migration to urban centres, especially Vientiane, is resulting in the gradual loosening of the traditional village structures from which such centres originally arose. The absence of land title within urban areas permits unrestricted public sector disruption of privately occupied plots with little prospect of adequate compensation to displaced people. Yet even so, the progress of infrastructure development is erratic. Road construction is apparently disorganised, and preparatory work may be wasted when construction teams fail to complete critical stages before adverse weather renders their work useless. Open sewers are virtually universal, and many urban properties still have no access to safe water supplies.

There has been a substantial increase in employment in Vientiane, as all levels of workers, from unskilled to professional and administrative staff, migrate towards the town to take advantage of the expanding employment market. Vehicle ownership has increased dramatically, especially two-wheeled transport. Consequently, despite some improvement in the urban road infrastructure, localised short-term traffic congestion is increasing, leading to increased noise and – although poorly documented – some deterioration in air quality. At present this is likely to be confined to peak traffic periods, but conditions may be expected to deteriorate, both in degree and in duration, in the future.

With the opening up of the country to tourism, the development of facilities servicing the new sector has become a boom industry. Large numbers of hotels and guest-houses line the streets near the river, whilst *al fresco* dining along the river bank has become a prominent

feature of the waterfront, as has the increase in the numbers of prostitutes working the area. In view of the poor health services and the wide geographical origins of the tourists, the potential for increased health risks within the resident population, including sexually-transmitted diseases, is rising and needs to be addressed as a matter of urgency.

5.3 Recommendations

5.3.1 The compliance crisis - enforcing the legislative framework.

5.3.1.1 Causation – why the law is ignored

The underlying cause of the failure or poor performance of projects, development programmes and even national policies in Lao PDR is the inherent weakness in the capacity of the environmental and social regulators within Government. The organogram (Fig. 3.1) reveals just how widely environmental and social responsibilities are distributed within the present Government structure.

The failure of STEA to exert a dominant role in ensuring a consistent high level of environmental management to enforce existing legislation designed to protect resources and manage their legitimate use by all members of society. Increasingly, this includes people who are not legally members of the Lao PDR, but who enter and exploit Laotian resources for their own economic purposes with impunity.

The administrative incompetence of some regulatory officials, coupled with the connivance of some local, Provincial and Governmental officials, police, judiciary and military sectors with these illicit activities renders any attempt to enforce compliance with national policies doomed to failure from their inception.

Whilst some of the problems in this field may be attributable to lack or finance, training, staffing and equipment within the government sector, the underlying question that needs to be addressed is simply this: what steps should be taken to build into development policies the necessary capacity to ensure that their objectives are supported by appropriate provisions to enforce compliance?

5.3.1.2 The need for effective enforcement policies

Whilst there is no single set of techniques that will achieve this in all circumstances, it is possible to develop a reliable framework for incorporating enforcement into strategic planning that greatly increases the probability of high levels of compliance in the field. To put the matter bluntly, given the fundamental and overwhelming importance of implementing effective and appropriate social and environmental management policies in Lao, compliance and enforcement strategies must become an integral part of the strategic planning process.

Compliance occurs when legal and policy requirements are fulfilled and specified goals and targets met. Identifying realistic goals and targets is fundamental to the success of an environmental management program. If they are well-chosen, then compliance will achieve

the desired environmental results. If they are poorly selected and inappropriate, then achieving compliance and/or the desired results will be difficult.

5.3.1.3 Responsibility and liability.

Enforcement is not solely the province of the Government, the police or the legal sector. Much can be achieved through negotiations between international aid agencies and domestic regulators and stakeholders, reinforced by a clearly defined set of responsibilities and liabilities on all parties.

The issue of liability is rarely if ever incorporated into project specifications, yet the current absence of defined personal stakeholder risks in the event of project failure allows initiatives to fold with no recriminations of any kind.

5.3.1.4 Compliance incentives

Nor are there clear definitions of the benefits of achieving compliance and meeting project targets for each individual stakeholder, that would provide them with a personal interest in ensuring that the programme is a success. Without formally defined personal incentives (and, of course, sanctions), there can be no guarantee that policies and programmes will be appropriate, meet their goals and targets, and benefit those who have an interest in them.

This applies at all levels of society, from governmental levels down to stakeholders in communities and families – projects need to be supported actively by all potential beneficiaries if they are to play a relevant role in development.

5.3.1.5 Inspection targets

Inspections to determine the compliance status of the regulated community and detect violations are an essential component of enforcement, but are absent from many development programmes within Laos at present. The fault often lies in the policy and programme specifications. Without clear standards, targets, mandated compliance levels, and improvement time-lines, inspections lack direction and fail to identify compliance failures early in the programme, when they can most effectively be addressed.

5.3.1.6 Hard and soft enforcement strategies

An effective compliance strategy and enforcement program brings many benefits to society

- First, and most important, is the improved environmental quality and public health that results when environmental requirements are complied with.
- Second, compliance with environmental requirements reinforces the credibility of environmental protection efforts and the legal systems that underpin them.
- Third, an effective enforcement program helps ensure fairness for those who willingly comply with environmental requirements.
- Finally, compliance can bring economic benefits to individual facilities and to society.

5.3.1.7 Deterrence

In any regulatory situation some people will comply voluntarily, some will not comply, and some will comply only if they see that others receive a sanction for non-compliance. Inducing deterrent behaviour is a central strategy in enforcement. It persuades violators that it is in their own interests to refrain from violating again, and spreads the message that other violators may also experience adverse consequences for non-compliance. Four factors are critical to deterrence:

- There is a good chance violations will be detected.
- The response to violations will be swift and predictable.
- The response will include an appropriate sanction.
- Those subject to sanctions perceive that the first three factors are present.

5.3.1.8 Failure of deterrence in Laos

The most commonly adopted assumption in Laos appears to be that the government has the legal authority, therefore it will impose compliance from above. This is known as the 'command and control' strategy. In Laos, it does not work, because the extreme shortage of environmental staff to monitor compliance especially in the more remote areas that are the most severely affected by resource depletion, makes the possibility of detection remote. Even when violations are detected, the frequent involvement of other enforcement agencies, such as the police and military, and of senior politicians and judiciary, makes any probability of an effective response predictable only by its absence. Consequently, no effective sanctions are imposed, and those responsible for violations learn that they can act with impunity.

5.3.2 Alternative approaches to achieving compliance

Enforcement is not necessarily obtained purely through the exercise of direct legal action. Within the local context, much may be achieved by recourse to community education and recruitment in monitoring and reporting violations, whilst the exercise of social pressures against violators can also be effective in some circumstances. However, in Laos social pressures may become increasingly ineffective as families become fragmented by migration of breadwinners to urban centres in search of work. This problem is recognised internationally, with the development of dedicated enforcement programmes within both governmental and non-governmental organisations.

Clearly, there is an urgent case for terminating the existing perverse and ineffective system as quickly as possible, but equally obviously, without profound political and administrative effort this is extremely unlikely to happen. Therefore if the European Community is to continue to support development in Laos, then it needs to consider what alternative

strategies may be adopted to achieve regulatory compliance in the social and environmental sectors and to include such strategies in its involvements across the board.

5.3.2.1 Voluntary control

Voluntary control encourages or assists, but does not require, change. Techniques include public education, technical assistance, and the promotion of environmental leadership by industry and non-government organisations. Voluntary approaches may also include some management of natural resources (e.g., lakes, natural areas, ground water) to maintain environmental quality.

To some extent this approach can be seen in the protracted negotiations over the development of the highly controversial Nam Theun 2 hydropower project, where successive waves of opposition and the publication of highly damaging scientific analyses of the project has forced the proponents and contractors to adopt an increasing standard of compliance with both national laws and with international agreements with a very wide range of applications.

5.3.2.2 Market-based/economic incentive approaches.

These use market forces to achieve desired behavior changes. They include:

- ***Taxation*** of emissions, effluents, and other environmental releases.
- Selling tradeable permits which allow companies to trade specified emission rights with other companies.
- ***Offset approaches***, that allow a facility to propose various approaches to meeting an environmental goal. Thus hydropower abstractions might be offset against the supposed consequential decreases in carbon emissions from conventional power stations.
- ***Auctions,*** in which the government auctions limited rights to produce or release certain environmental pollutants. Carbon and other pollution emission trading is an international form of this approach, but in Laos carbon trading at least is currently unreliable due to the unregulated destruction of forest land. If a specified forest lot subject to such an agreement is cut down, the trading agreement becomes meaningless.
- ***Environmental labelling/public disclosure***. This pre-supposes that the public is able to understand the implications of the labelling or disclosure, and that the regulators are not misled by unverifiable claims.

5.3.2.3 Risk-based approaches.

This approach to environmental management requires priorities to be established for change based on the potential for reducing the risks posed to public health and/or the environment. For example, assessment of hydropower economics should include the counter-costs of

losses of resource values in forestry, conservation, wildland products, and fisheries, and the social costs of resettlement etc.

5.3.2.4 Liability

Liability approaches make an individual or organisation responsible for any environmental damage caused to another person or business as a result of their actions. Their effectiveness is dependent on inducing caution or fear in those liable to be accused. Whilst the wish to avoid sanctions from government in Laos is currently not a major concern at the upper level of criminal activities, the imposition of liability by financial institutions may in some circumstances constitute a disincentive if stringently applied from outside the country – for example international constraints on money-laundering may act directly against individuals and companies engaged in illegal logging, or might also be made conditionalities of government-directed aid.

5.3.3 Developing a strategic approach to achieving effective compliance

To summarise, strategic planning for social and environmental development within Laos must include effective programmes of enforcement founded on :

- Creating requirements that are enforceable.
- Knowing who is subject to the requirements and setting program priorities.
- Promoting compliance in the regulated community.
- Setting social and environmental quality standards and monitoring compliance.
- Responding to violations using a range of pressures designed to bye-pass the existing weaknesses in enforcement capacity.
- Clarifying roles and responsibilities of stakeholders at all levels of society.
- Evaluating the success of the program and holding program personnel accountable for its success.

Such components need to become an integral part of the EC's social and environmental development strategy for Lao PDR. Without them, the regulators will continue to be ineffective in halting the rapid and unsustainable exhaustion of declining critical natural resources and the inevitable spread of the symptoms of unbalanced industrial development and urbanisation – environmental degradation, declining public health, and social disintegration, unbalanced urban expansion, and the reinforcement of the poverty gap that are already evident in the country.

5.4 Specific sectoral issues in project development and support

5.4.1 Forests - Strategy for sustainable management

5.4.1.1 Human occupation

The protection of sufficient upland forest resources to secure watershed protection and biodiversity conservation is essential if the environment is to be preserved. Two predominant pressures on forest resources are shifting cultivation and uncontrolled commercial logging.

5.4.1.2 Shifting cultivation (swidden)

Shifting cultivation is most significant as an environmental and social problem in Lao PDR. Government figures indicate that between 1982 and 1989, over 300,000 ha were cleared and planted for shifting cultivation by an estimated 280,000 families. In the 1990s, government programmes to resettle upland residents and provide them with alternative livelihoods helped stabilise the practice. By 1995, the area decreased to 192,258 ha with 198,868 households and by 1998 to 148,000 ha with 156,720 households.

However, most of the rehabilitated area was in the sloping lands surrounding the Mekong Corridor, while shifting cultivation continued unabated in the remoter upland areas. It is estimated that 70 percent of northern households practice shifting cultivation, compared to only 12 percent for the flatter southern region. There are two main types of shifting cultivation based on ethnic minority practices. The Khmu in the midlands traditionally practice rotational cultivation, while the Hmong and other highland groups have more commonly practiced the pioneering variant, with frequent moves to virgin areas.

The Government is attempting to stabilise shifting cultivation by 2005 and apparently eliminate it altogether in the longer term. This is a major policy error:

- Whilst swidden farmers are generally extremely poor, abolishing their sole means of livelihood without full replacement of an economically and culturally acceptable alternative contravenes EC requirements to protect human rights; experience has shown that some indigenous groups are not able to adapt to enforced (or indeed, any) resettlement, and many may die, regardless of the provision of apparently improved facilities;
- Many relocated people are unable to cope with the different demands of unfamiliar agricultural conditions and systems;
- Valuable traditional knowledge is lost, and this may result in significant future loss of royalties to individuals and the state;
- Moving people out of a Protected Area automatically converts it into an Unprotected Area, accessible to incursants and plunderers;
- It eliminates a significant part of the national food production base.

Wherever possible, indigenous peoples should be allowed to stay in their traditional lands; only recent incursants should be removed. The objective must be to re-establish stability in the carrying capacity of the forest for humans, wildlife and plants. Far more attention needs to be paid to providing adequate assistance with health, welfare, alternative crops and improved marketing access, recognising the essential strategic role that such communities play in stabilising the system and deterring unlimited exploitation of the resource base.

5.4.1.3 Logging

The more serious problem of commercial and mostly, illegal logging, will require a shift towards clean and accountable governance at the highest levels in order to crack down and eradicate corruption in the forestry sector. Until the rule of law is respected at official State and Provincial levels illegal logging and illegal export of logs will continue to undermine the forest resources.

In this respect, two initiatives are proposed. First, the regulatory powers and role of STEA must be increased and respected. Second, it is hoped that Laos can become a central player in the EU international FLEGT initiative and play an active role in mainstreaming FLEGT activities within the Mekong region.

5.4.1.4 Tree crops

It is known that foreign investors are planting large border lands with rubber, sugar and other tree crops. Some of these crops are being cultivated on inappropriate sites with little regard for environment or long term sustainability. Far greater control over such developments is essential, and no support should be given to such projects unless they are fully specified and monitored, and provision made for their appropriation by the State of they fail to comply with the conditions stipulated.

5.4.2 Protected Areas

Whilst some progress is being made in enlarging Protected Areas, pressure upon their integrity from both internal and external developments that are likely to be detrimental to their sustainability are increasing. In this respect, improving capacity to manage such areas is essential simply to maintain the existing status quo. Achieving the desirable objective of actually reducing these pressures will require establishing a much greater capacity to influence national and regional planning policies, and to enforce the legal protection available through domestic and international legislation.

5.4.2.1 Management issues in PAs / NBCAs

The government and International Development Agencies (IDAs) attempted initially to develop Integrated Conservation and Development Projects (ICDPs) within NPAs, but results have been disappointing. The lesson learned is that all development projects,

regardless of their sector, need to consider environmental consequences. Conservation projects are most likely to be effective if they consider the needs of local people, and/or empower them with some management responsibility yet, for example, many proposed hydropower projects within or close to NBCAs, have been designed to restrict or even displace local people on entirely spurious and unjustified grounds. The main lessons learned were

- It is unsound to attempt to combine two significantly different components, such as biodiversity conservation, and forest management;
- Great attention in project design needs to be given to clear and unambiguous objectives;
- Project design must make structured allowance for reformulation of sub-objectives and outcomes;
- Projects should not be designed with direct reference and apparent linkage to unconfirmed future funding;
- Project formulation needs to include resources to assist developing Government policy and legal frameworks and setting milestones which will reflect on-going government commitment;
- Independently executed projects are likely to be far more suitable for the complexities of ICDP processes than National management;
- In piloting ICDP processes, more attention be paid to winning the confidence of community and local government through a limited number of short-term ICDP initiatives;
- Much greater awareness of the needs of, and need for, biodiversity conservation is required at both the government and community level.[24]

5.4.3 Conflicts over access to, and use of, water

Conflicts of use of water for human demands and for sustaining the fisheries pose a universal dilemma and, as in many other countries, they are increasing in Laos. Hydropower and agriculture are the greatest threat to the long-term sustainability of the fisheries, and the problem is of basin-wide concern. Only planning and development regulation on this scale will ensure the continuation of a coherent river ecosystem and its vital fisheries, but local action is also needed to balance abstraction against the needs of the aquatic environment.

5.4.4 Protecting fisheries resources

In the fisheries sector, monitoring of the impacts of existing abstraction schemes, especially hydropower, needs to be intensive, and the environmental costs fully incorporated into the analysis of future proposals. The reliance of poor people on fish as an environmental 'free

[24] ICEM 2003

good' is absolute, and developments that reduce this vital subsistence source must be scrutinised to ensure that all possible mitigatory actions are put in place to protect it. Economic costs to the proponent should not be recognised as a relevant objection to this issue.

5.4.5 Environmental threats of agriculture

Agriculture has important environmental implications and significantly affects the quality and quantity of water and related resources in the Mekong Basin. The major mechanisms by which agriculture affects the environment are: deforestation due to the clearing of land for shifting or sedentary cultivation; irrigation; and the use of chemical fertilisers and pesticides. All of these environmental influences affect resource use and sustainability and put constraints on agricultural activity.

5.4.5.1 Irrigation

As the greatest consumptive user of water in the basin, irrigation schemes have implications for water levels and water quality in the Mekong River and its tributaries. It is estimated that in Laos , irrigated agriculture accounts for around 82 percent of total abstractions. With demand for water rapidly increasing, there are strains on the supply of water for agricultural use. In many communities, water supply is insufficient for 2-5 months of the year, and reservoirs are often not full enough to meet irrigation demands.

Moreover, excessive irrigation in the dry season and irrigation with poor drainage can, in combination with certain soil and water conditions, cause salinity problems. Salt can accumulate in the subsoil and at the surface, and cause immediate damage to agriculture and fish production and productivity, as well as long-term soil deterioration.

Irrigation abstraction can also alter river discharge regimes, especially in smaller tributaries, and therefore is a competitor to the natural fisheries on which people rely for much of their high-class dietary protein.

5.4.5.2 Pesticide and fertiliser use

Pesticide and fertiliser use is another important means by which agricultural activity may impact the resources of the basin. While overall the rate of chemical application in Laos is comparatively low, there are problems with improper handling and the use of banned pesticides. Farmers in Laos are generally unaware of the potential dangers of pesticides.

5.5 Alternative strategies for future development

All countries have a history of natural resource depletion followed by substitution by first a manufacturing and ultimately services based economy. However, the opportunity for Laos to transform from an agricultural based economy to a manufacturing economy is severely restricted. China, Thailand and Vietnam are able to produce items cheaper and more easily than Laos. The domestic market in Laos is small and Laos is unable to compete in the export market.

Future large-scale economic development strategy therefore rests with electricity production for export, and mining. These activities will provide revenue for Government but do not address poverty nor livelihood issues for the predominately rural population. However, rural livelihood opportunities can be identified at the level of local, small-scale but extensive development. For example, opportunities exist for private plantation forestry at small-holder and investment company levels.

The ADB-supported plantation projects have encouraged plantation development as feedstock to privately-funded pulp and paper manufacture. The Burapha Group in Vientiane now manufactures high quality garden furniture from plantation Eucalyptus and exports this to Europe and SE Asia. Opportunities exist for smallholders to plant eucalyptus plantations to support expanding raw material markets for furniture and pulp. This activity does and will continue to provide income and employment to the rural poor. It appears that customary land rights are sufficiently effective to safeguard farmers downstream harvest rights to the plantation wood.

International aid agencies, NGOs and other institutions have been assisting the Government of Laos by tackling environmental issues, poverty and economic development for decades. Generally, environment sector development projects have been only partially successful. There are two chief reasons for poor project performance. First, Government support for environment and natural resources management projects is weak. Second, development projects generally suffer from over-ambitious objectives with little thought to actual implementability in the field. Lessons learned from project evaluations should be incorporated into the design of future projects. Development projects should be small and simple and should not be formulated without Government of Laos support. It is critical that projects be Government, and not donor, driven.

TECHNICAL APPENDICES

6. Technical appendices.

The following Technical Appendices include essential background material relating to the findings of this study.

6.1 Technical Appendix No.1. Environmental maps of Lao PDR

The socio-environmental maps included in this section are the most comprehensive and up-to-date currently available. They provide 'at a glance' views of the most important ecological and social components across the entire country. They form part of the ICEM Report, 'Lao PDR National Report on Protected Areas and Development. Review of Protected Areas and Development in the Lower Mekong River Region' (2003). We are grateful to Dr. Jermey Carew-Reid, Director of the International Centre for Environmental Management, Indooroopilly, Queensland, Australia, for his kind permission to reproduce them.

6.1 Technical Appendix No.1. Environmental maps of Lao PDR

Fig. 1. Biogeographical Zones.

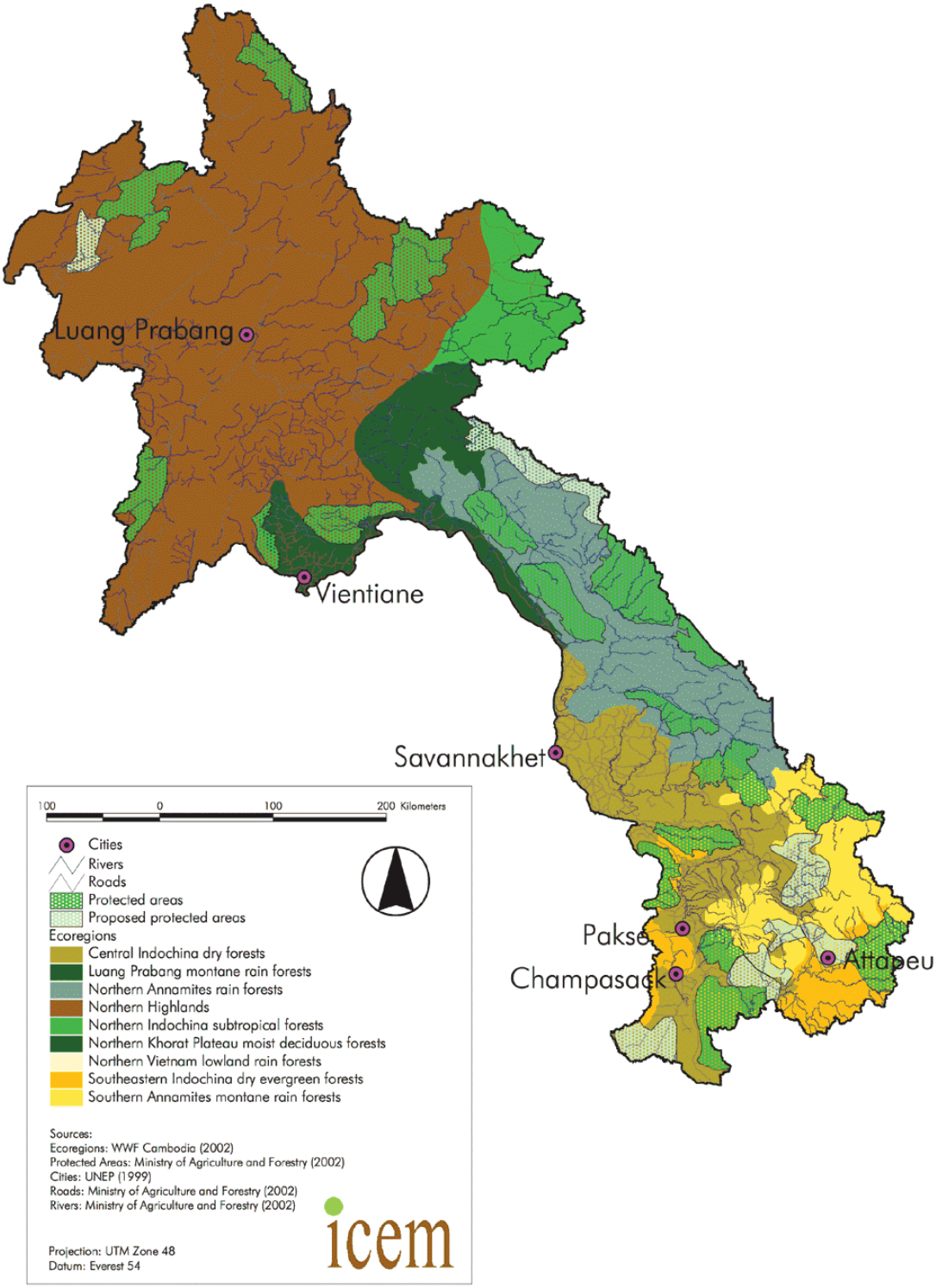


Fig. 2. Land use.

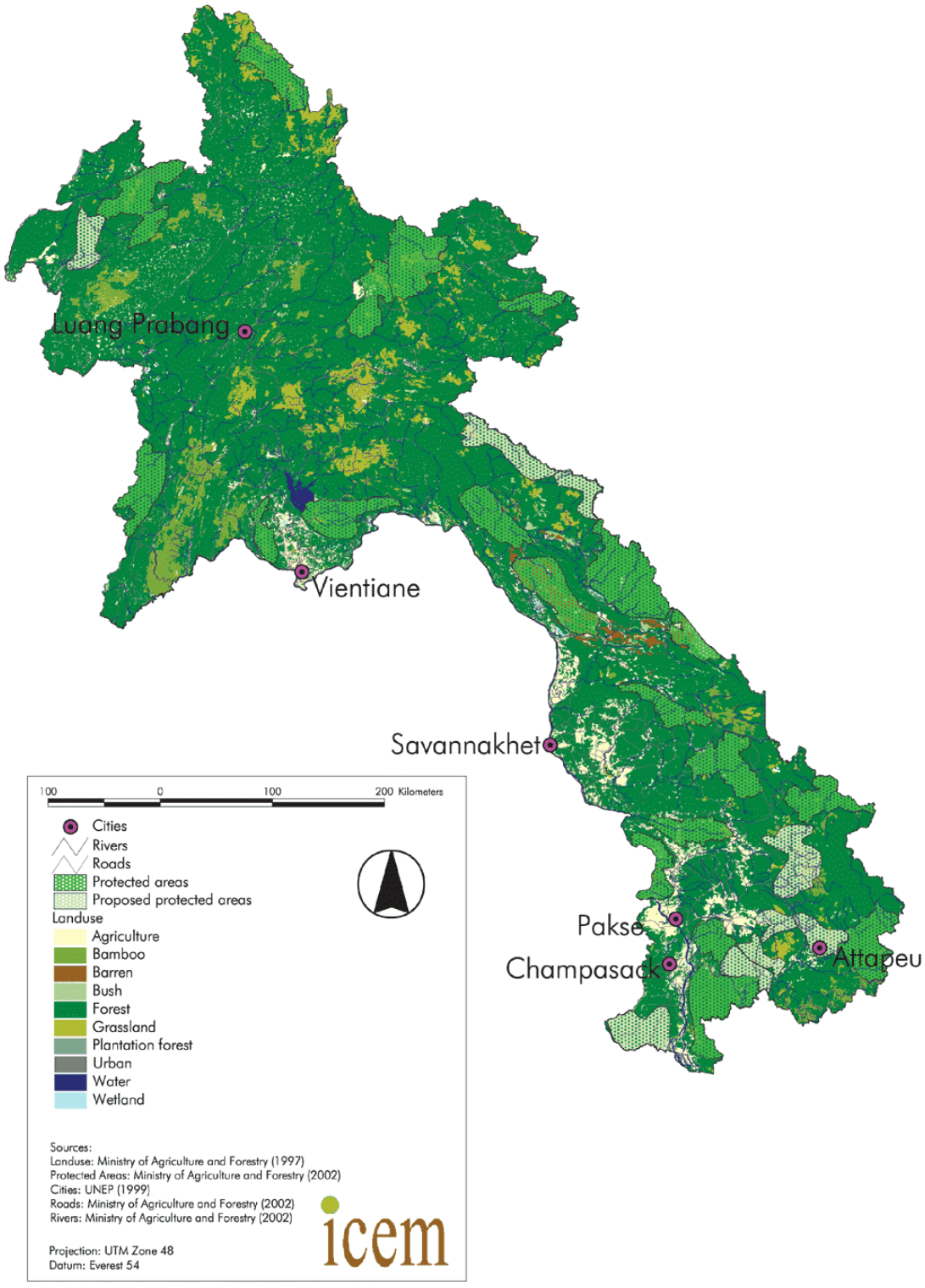


Fig. 3. Protected Areas.

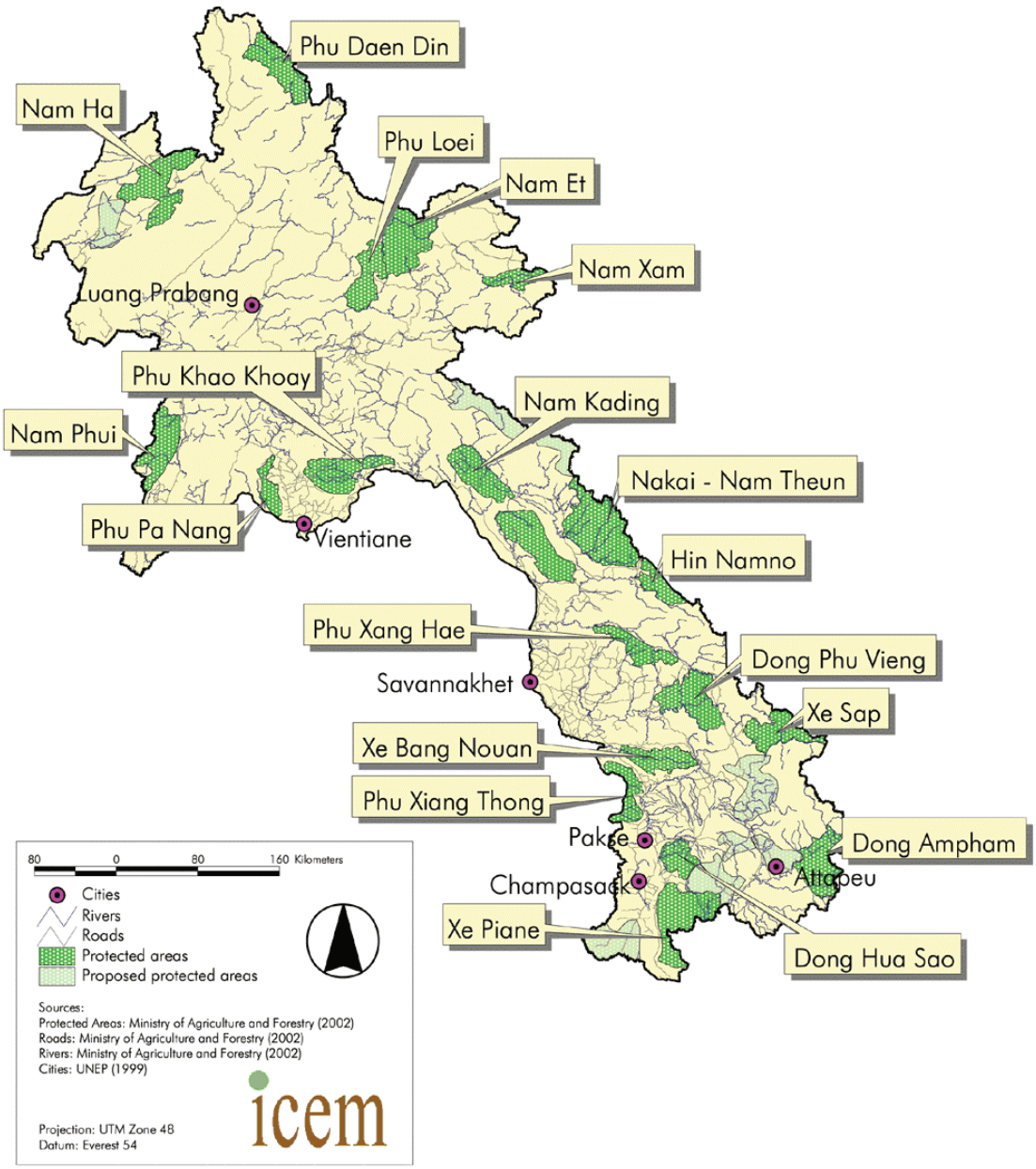


Fig. 4. Population density.

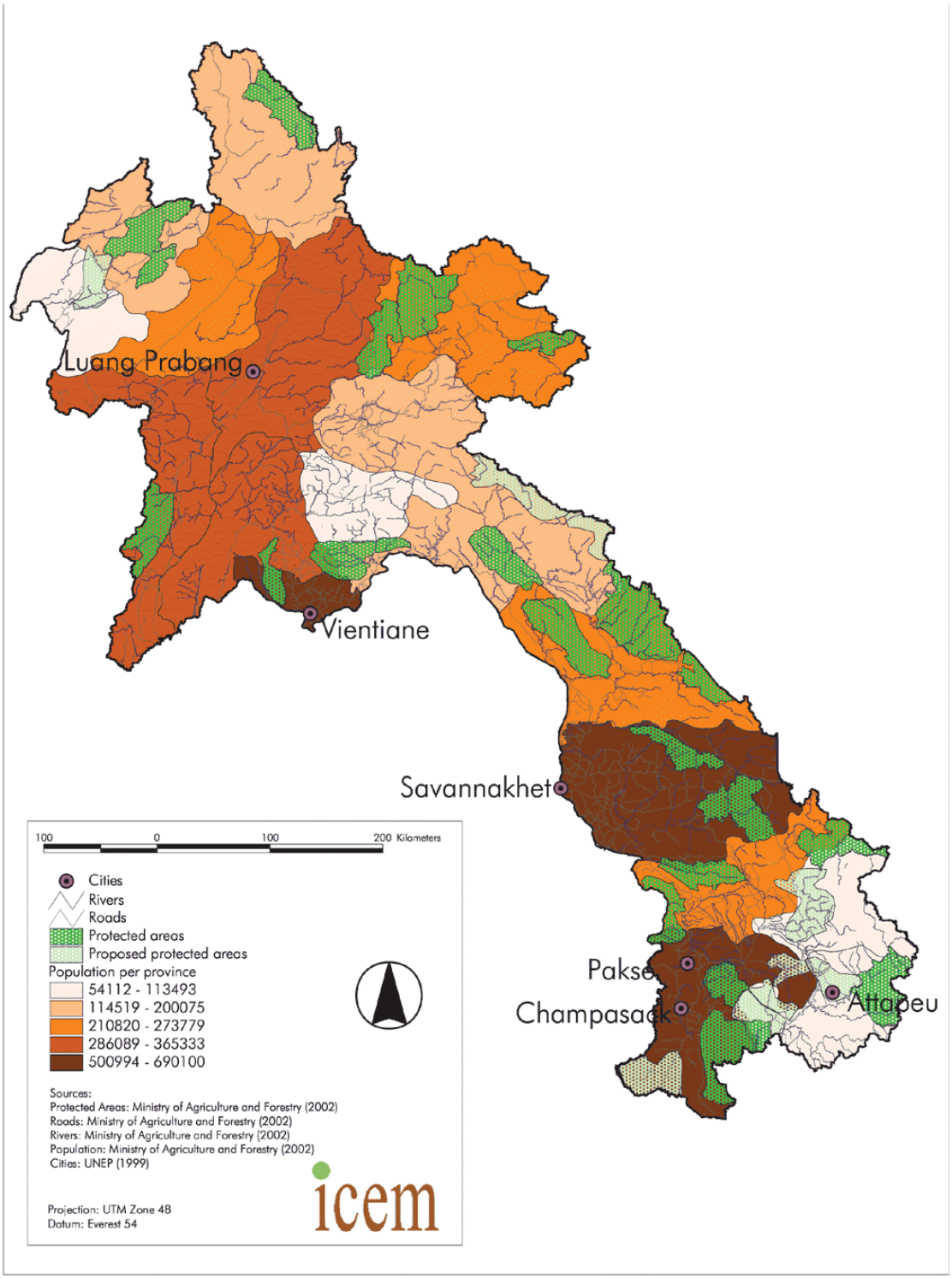


Fig. 5. Buffer Zones around areas of human habitation.

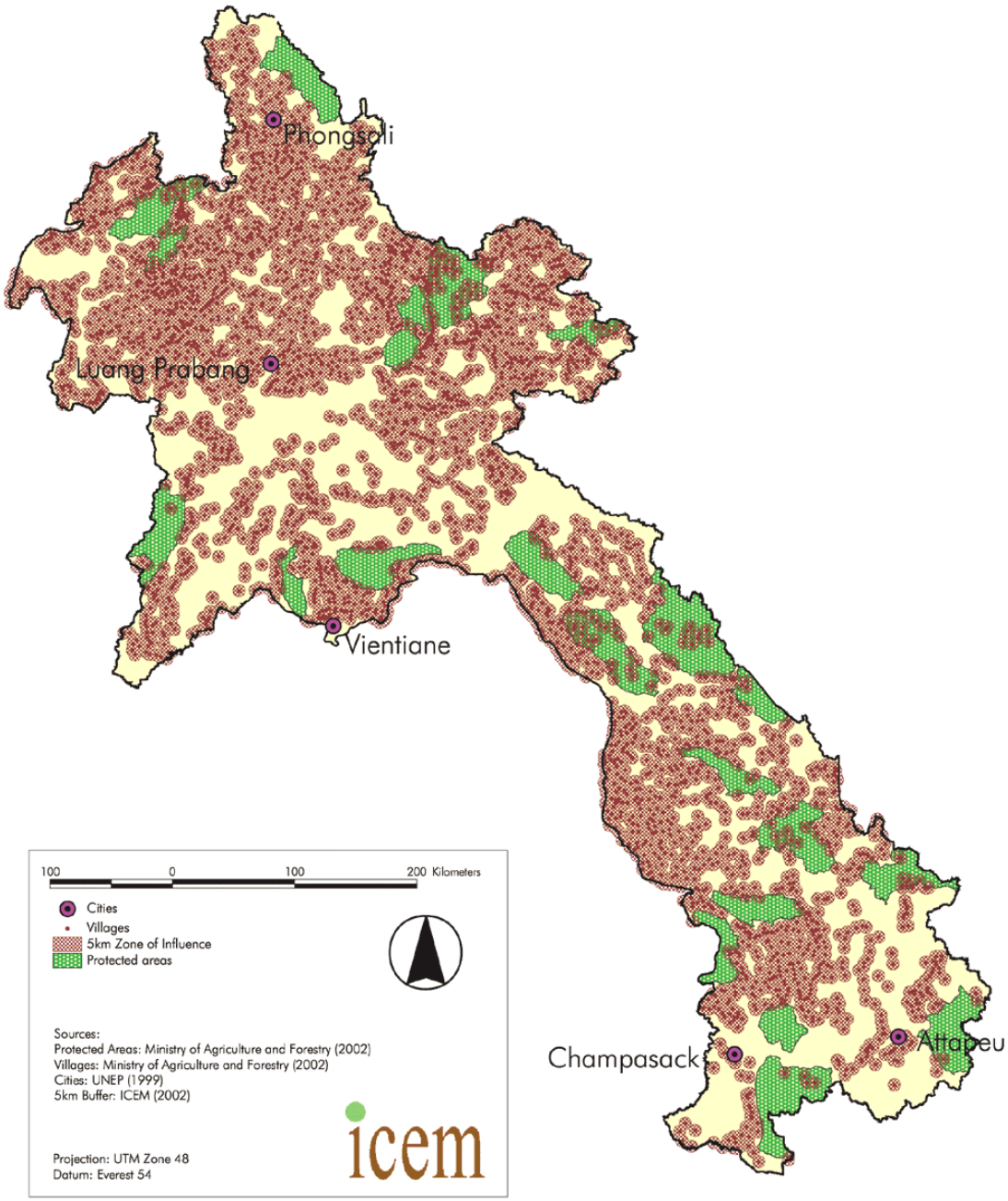


Fig. 6. Wildlife trade flows

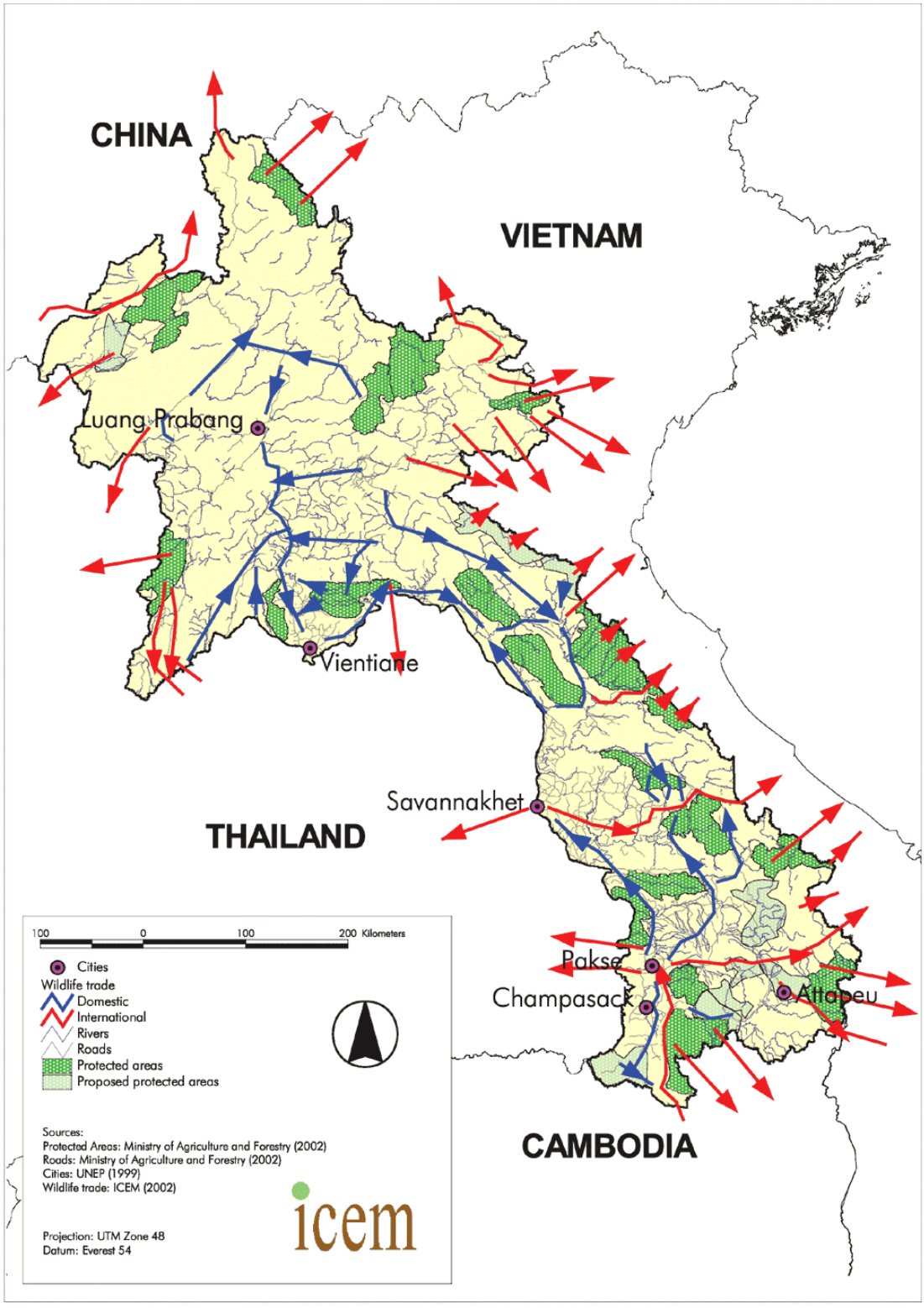


Fig. 7. Poverty profile of Lao PDR

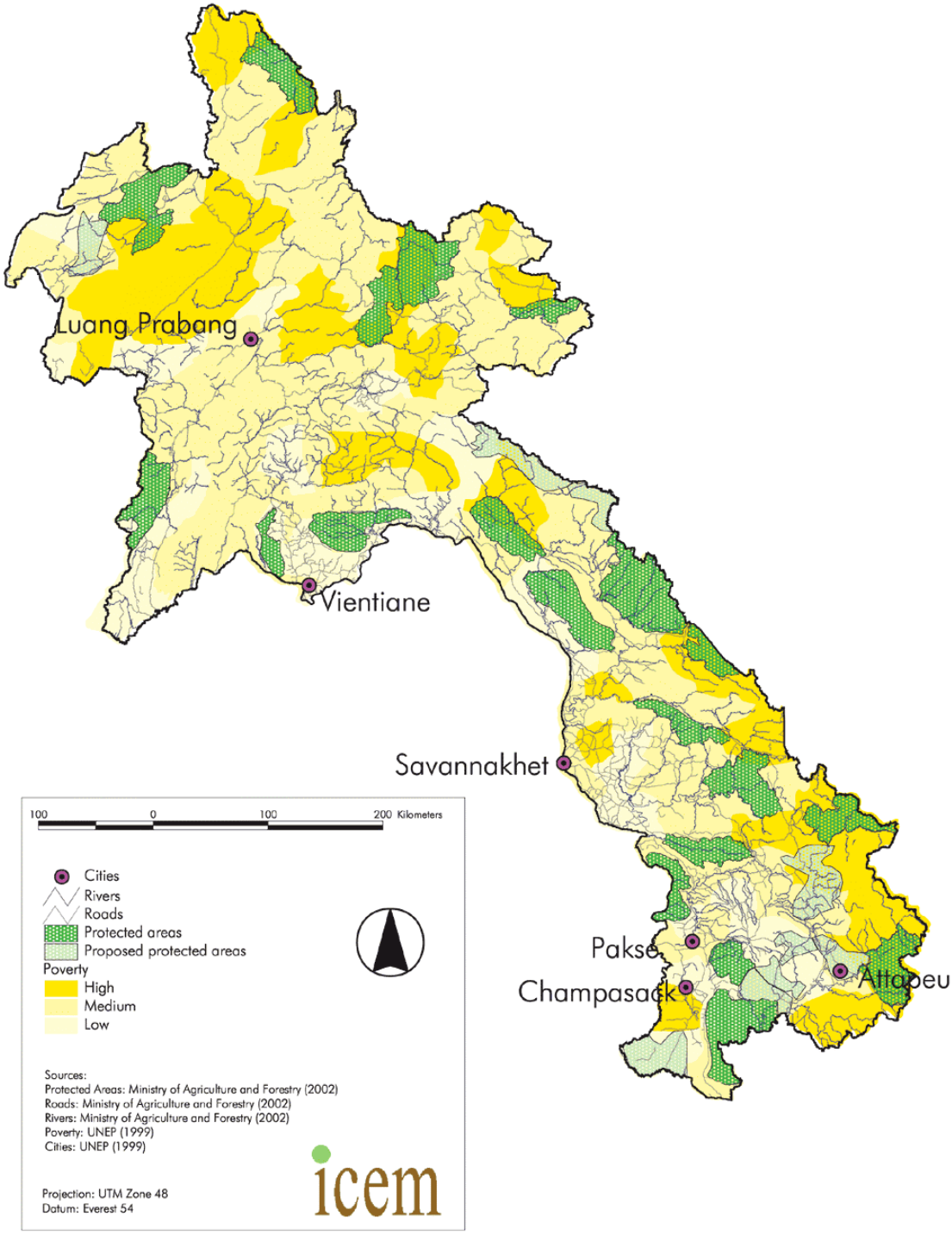
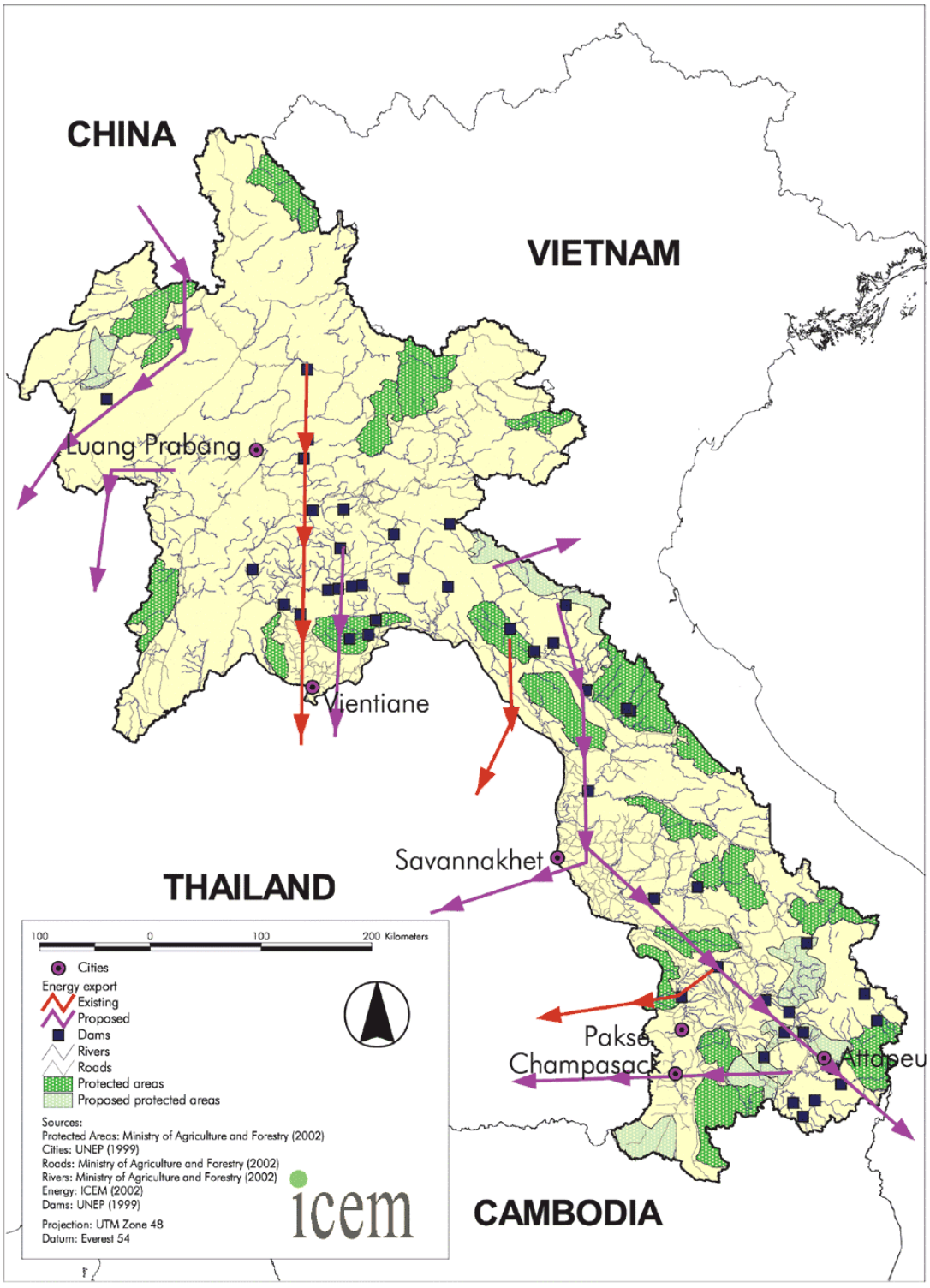


Fig. 8. Energy production and transmission



6.2 Technical Appendix No.2. Environmental trends and possible actions

The tables of current environmental trends enable the reader to appreciate the significance of socio-environmental trends in Laos in a number of fundamental fields which correspond to some extent with those included under current Millennium Development Goals. They identify the direction, scale, severity, and time-scale of these trends. They indicate who wins and who looses as a result of these changes, and suggests possible directions in which effective action might be taken to moderate or reverse adverse trends.

Issues		Direction	Scale	Severity	Time-scale	Winners	Loosers	Action
Asset stripping – illegal logging		Adverse	Widespread	Extreme	Immediate, permanent	Entrepreneurs politicians	Indigenous peoples	Enforcement to be tailored to induce better compliance
- non timber products		Adverse	Widespread	Severe	Immediate permanent	Poachers	Indigenous peoples	Establish specified residents' ownership interests and exploitation rights
- Bioprospecting		Currently neutral	Currently very small, but liable to increase	Potentially beneficial, but only if regulated	Current, will increase	Pharmaceutical industry, indigenous peoples, Lao Government	Potentially, Indigenous peoples and Lao Government	Set up licensing system for bioprospecting, and include provision for intellectual property recognition and royalties for local sources.
- endangered species		Adverse	Widespread	Severe	Immediate permanent	Poachers	World biodiversity	Stronger inter-state co-operation and enforcement
- money laundering		Adverse	Unclear but reportedly widespread	Locally very severe	Current, permanent	Loggers and other developers, politicians	Indigenous people, international implications	International co-operation with Governments, banks, etc. Confiscation of property, etc in legislation
Population Indigenous population growth	Residents	Unclear	Est 2.6% to 3%/year	Severe in highland areas	Uncertain	None	Low capacity land dwellers	Improve birth control education and availability of contraception
	Internal in-migration	Adverse	Mainly historical	Unclear but locally serious	Current, likely to be permanent	None	Indigenous peoples and incursants	Local controls on in-migration operating at district and Provincial levels.
Non-Lao population growth	Incursion	Adverse	Locally significant	Potentially very severe and increasing	Immediate, and increasing	Some incursants	Indigenous peoples	Urgent need for facts on this new development, for policy decision
	Refugee resettlement	Adverse	Relatively small and localised	Unclear	Continuing	Refugees	Possible displaced individuals	Need for facts on this for policy decision

Issues	Direction	Scale	Severity	Time-scale	Winners	Loosers	Action
Infrastructure development – provincial roads	Beneficial	Currently moderate but may increase in future	Generally low impact on environment	Continuing	Rural people, traders, administrative sector	None identified	Direct planning to restrict road types to those appropriate for local conditions
- transboundary roads	Mixed	Very restricted	Potentially extremely damaging	Current and near future	Potential incursants, illegal traders, money launderers	Indigenous peoples, natural resources, Protected Areas	Better recognition of potentially damaging environmental impacts of badly routed inter-state highways
- hydropower	Adverse	Potentially very extensive	Extremely threatening to ecological and social interests	Current and expanding long-term	Investors	Indigenous peoples, all fisheries interests in Basin	All schemes to be subjected to detailed EIAs (external scrutiny if necessary); SEA and Cumulative IA mandatory; Integrated Basin Management
- mineral mining	Adverse	Isolated but downstream impacts could be extensive	Locally very severe, possible also on wider scale	Immediate; duration unclear	Investors, Lao Government	Indigenous peoples, downstream communities and riparians	International scale EIA and CIA mandatory (external scrutiny if necessary – delays could be dramatically dangerous if pollution not identified and controlled)
- eco-tourism	Beneficial	Currently small but potentially very wide	Locally small benefit; centrally profitable	Current, permanent	Entrepreneurs, possibly local people; Lao Government	Some risk to indigenous communities	Closer co-ordination of development with wildlife and social regulators and NGOs

Issues	Direction	Scale	Severity	Time-scale	Winners	Loosers	Action
Food security **– access to resources**	Adverse	Widespread and increasing	Critical	Current and ongoing	None	Poor people	Provision of legal protection to access of specific resources for affected
- access to markets	Mixed	Widespread	Serious to developing communities	Current; long term for many	Developing communities ; incursants	Biodiversity may be threatened	Enforcement of protection of endangered species; better supervision of rural markets
- crop security	Adverse	Local	Critical to relocated people	Current	None	Relocated communities	Provision of alternative cash and subsistence crops, esp to replace poppy/drug crops
Urbanisation/industrial development **- Water pollution**	Adverse	Locally common	Moderate, increasing	Current, medium term	Industry	Local communities, fisheries	Expansion of sewerage development projects for urban centres (urgent)
- air pollution	Adverse	Mainly large urban areas	Low level, liable to increase	Current, permanent	Industry	Local communities	No current severe problems, but adequate monitoring should be set up in Vientaine
- traffic congestion	Adverse	Very local	Moderate	Daily very short term; permanent	None	Commuters, traders	Review of critical congestion points in Vientiane; poor rate of road upgrade responsible for some local problems
- solid waste disposal	Adverse	Very local	Generally low; mining sector very severe	Current and increasing long term	Industry	Communities near disposal sites	Review country-wide needs for disposal; monitor mine waste sites stringently
- industrial accidents	No data						Assess need for monitoring, esp. in expanding urban centres
- disaster risks	Unclear	Local	Locally severe	Current, permanent	None	Mainly agriculturalists in valley bottoms	All projects/developments liable to induce disasters to be subject to stringent EIA; liability of proponents to be established in law

Issues	Direction	Scale	Severity	Time-scale	Winners	Loosers	Action
Social issues **- access to clean water**	Unclear	Locally common	Moderate	Current; could be improved medium term	None	Rural communities in some areas	Direct investments to NGOs working in this sector, as private schemes more likely to prove sustainable
- sanitation	Unclear	Widespread	Severe in larger communities	Current; could be improved medium term	None	Rural communities in some areas	High priority in urban centres, especially those with high numbers of in-comers and tourists
- education	Adverse	Widespread	Severe	Current, increasing in future	None	Rural communities, esp. women	Target areas with highest inequalities; improve work conditions for teachers
- employment	Adverse	Widespread	Very severe	Current, and increasing	None	Poor people, women	Work with NGOs promoting trade in home-produced goods; positive discrimination for females in professional employment
- basic health care	Static	Widespread	Critical	Ongoing	None	Rural people	Direct support to health NGOs and health care worker training; improve work condition for rural health workers
- mental health	Not available	Low level but universal	Severe	Ongoing	None	Mentally ill, resettled groups	Expert review of current needs, urgent as family links weaken through urban development
- prostitution & STDs	Adverse	Local. Some freelance, some organised	Potentially critical	Current, and increasing	Organised crime, money launderers	Women, state medical services	Provide free health monitoring for working prostitutes; clinics for anyone with suspected STDs
- gender inequality	Adverse	Widespread, cultural variations	May be severe in some communities	Current, long-term	Males	Females, State	Central high-level review of scale of problem and economic costs to State

6.3 Technical Appendix No.3. Comments arising from meetings.

This table summarises specific issues and comments that were received during interviews with experienced Agency staff working within Laos. They show where institutional weakness is an obstacle to regulation and enforcement, but also provide an indication of what types of project have been able to achieve acceptable results. They might be used as reference models in devising future policies in which the lessons learned can be applied at a more central level of policy planning.

DONOR/ AGENCY	PROJECT/ACTIVITY	COMMENTS
ADB	Range of grant and loan investment projects	ADB, through its forest plantation for livelihood projects (phases I and II) has catalyzed the development of private plantation development in Laos. This provides important livelihood options for entreprenurial farmers. Markets for plantation grown wood are good in the furniture, construction and pulp forest industry sectors.
STEA	Government of Laos environment agency	STEA recognizes the need for good governance and for government staff in ministries and environment agencies to have clear roles and responsibilities and to be accountable for actions.
WB	Range of development projects	The Environmental Protection fund (funding tranches from WB and ADB) represents an important umbrella fund at the disposal of the Government of Laos to fund national environmental initiatives. Two activity groups are foreseen, policy development and investment. It is hoped this fund will give impetus and authority to the activities of STEA
MRC	Mekong wide regional initiatives	Laos continues to provide environmental goods and services to the Mekong river and delta. Deforestation is not yet so severe as to significantly reduce watershed protection functions or habitat for major biodiversity. Yet, foreign investment and national development programmes threaten the long term sustainability of environmental integrity unless environmental guidelines and laws are upheld.
JICA	Range of development projects	JICA has played an important role in the Department of Forestry, especially with regard to support for the preparation of the Forestry Strategy by the Ministry of Agriculture and Forestry, and in the preparation of environmental guidelines.
ECOLAO	Consultancy firm	ECOLAO made important contributions to the Cumulative Impact Assessment Report of the Nam Theun 2 Hydropower Project and in so doing led the debate on the importance of sustained yield management of the forests of Laos.

DONOR/ AGENCY	PROJECT/ACTIVITY	COMMENTS
BURAPHA	Private Eucalyptus plantation forestry integrated with furniture manufacture market.	Long term sustained yield private forestry provides a good opportunity for sustainable livelihoods for smallholder farmers to produce and sell fast growing exotic forest plantations to the furniture, pulp and other forest industry in Laos
SIDA/ Ramboll Natura	Strengthening Environment Management through STEA	This project, along with the UNDP support to the Governance and Public Administration Reform Project recognizes the institutional weakness and poor capacity of Government of Laos Institutions and Ministries. STEA has a large environmental protection mandate yet has insufficient financial and human resources to meet the challenge. The SIDA supported project represents an important step towards institutional support and reform.

ADMINISTRATIVE APPENDICES

Appendix 1

Study Methodology

Appendix I Study Methodology

1 Team composition.

The study was carried out by two senior Grade 1 Experts, both of whom had extensive prior experience working in Laos. The Team Leader was Senior Environmental Specialist on the 1996-8 Se San, Xe Kong and Nam Theun Basins Hydropower Study, and Environmental Expert on an FAO mission to assess shifting cultivation in Huaphanh Province. The second team member is a forestry specialist who worked on sustainable forest management in Laos from 1997-9.

2 Study methodology.

Objective

The purpose of the study is to identify those aspects of environmental (and this includes social) concerns that need to be addressed in developing the EC's 'Country Strategic Plan' for Lao PDR. At present environmental concerns are not fully 'mainstreamed' in strategic planning, yet Laos has an extremely high environmental importance in the region, and at least 85% of the indigenous population are directly dependent on environmental goods and services for their subsistence and welfare.

The aim of this study is not to provide a detailed compilation of environmental facts and figures; a great deal of such data are available electronically on line. Instead, it concentrates on identifying relevant issues that must be considered in any strategic planning for future investments and support, discusses how they affect the likely viability of future actions, and recommends approaches to dealing with obstacles to effective support and development within the socio-economic and political framework of the country as it was at the time of the study.

The analysis inevitably reveals issues that are politically sensitive. But without full recognition of the constraints the currently exist, and restructuring policies to reduce or avoid them, no effective improvement in the current low level of project and investment achievements can be expected.

Study preparation. Following the provision of EC documentation on the role of environment and social issues in strategic planning, the Team Leader had an initial briefing with EC staff in Brussels. He then travelled directly to Vientaine to set up residential, financial and communications facilities. He was joined by the second team member shortly after.

Meetings. A detailed list of contacts and officials was prepared and a timetable devised for meetings and data collection in Vientiane. These meetings were carried out mainly during the first two weeks of the mission.

Data collection and desk analysis. Extensive use was made of local and external sources of data, and copies of many key documents secured from Internet sources.
In-country field work. Severe time limitations prevented extensive travel by team members. However, a visit was made to a private smallholder plantation outside Vientiane. In general the Consultants drew on their own extensive field experience throughout the country, using recent information and reviews from local sources to update this as necessary.
Report preparation. An initial outline and section drafts were prepared by the Consultants in Laos during the final week in Vientiane, following which the Team Leader prepared the Draft Report in the UK.
Debriefing with the EC. The Team travelled to Brussels for a de-briefing and discussion of the Draft Report with the EC country officers on July 1st 2005.
Consultation. Following submission of the Draft Report, comments from interested parties were used to compile the Final 'Country Environment Statement'
The full study timetable is provided in the Table below.

3 Approach

The approach taken by the consultants has been to assume a consultative approach with relevant stakeholders, and the mission team has been careful to undertake an extensive round of consultations with the major stakeholders and actors in Lao PDR during the period of the study The full list of persons and organisations consulted is included in Appendix II.
Every effort was made to interview officials and staff from key organisations personally. However, much of the information on the work undertaken by the Government of Lao, donor agencies, NGOs and the private sector is available from official internet, sources, and in order to complete the mission within the available time-frame extensively use of these was also made to secure additional details to those obtained through personal interviews. A full list of documents obtained either directly from sources within Lao PDR or from electronic sources is provided in Appendix IV.
In this way a balanced view of the state of the environment has been generated which the consultants believe reflects consensus within the international community. It has not been possible, within the time allowed for the study, to undertake extensive visits outside Vientiane to view particular sites of environmental interest or concern. Where possible, staff of field based projects have been contacted and interviews arranged in Vientiane in order to capture views and opinions of staff working outside Vientiane.

Consortium AGRIFOR Consult

Country Environmental Profile Lao PDR

	EXPERTS	May 2005				June 2005				July 2005				MAN-DAYS			
		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Laos	Brussels	Home	Total
1	Team Leader *Mr. Cross Douglas*													17 [3]	1 [2] + 1 [5]	5 [2] + 3 [4] + 1 [6]	28
2	Environmental expert *Mr. Devenish Stephen Charles*													17 [3]	/	4 [2] + 3 [4] + 1 [6]	25
3	Expert in Buckstopping *Mr. Dufrasne Simon*													/	/	/	/
TOTAL														34		19	53
Reports - *Draft Final Report (X1)* - *Comments (C)* - *Final Report (X2)*																	

X1

C

X2

Notes :

1 Initial briefing in Brussels

2 Desk analysis

3 Field phase

4 Report finalisation (draft final report)

5 Debriefing in Brussels

6 Report finalisation (integration of comments)

Study Timetable

Appendix 2

Consultants Itinerary

Appendix II. Consultants Itinerary

Date	Activity	Location
Sunday 29th May	Team Leader travels to Brussels	Europe
Monday 30	Briefing of TL with EC in Brussels	Europe
31	Team Leader arrives Lao PDR	Vientiane
1st June	Second Team Member arrives in Vientiane; Accessing data sources, reading documents	Vientiane
2	Briefing with EC Delegation in Vientiane Meeting with STEA Meeting with CARE International	Vientiane
3	Meeting with Nam Theun 2 Power Company Meeting with Lao Red Cross	Vientiane
4	Document retrieval and reading	Vientiane
5	Document reading, informal meetings	Vientiane
Monday 6	Meeting with ECOLABEL Meeting with JICA Meeting with FAO	Vientiane
7	Meeting with Forestry Department Meeting with STEA (re UNDP funded projects) Progress meeting with EC Delegation in Vientiane	Vientiane
8	Meeting with World Bank Meeting with Nam Theun 2 Power Company Meeting with IUCN	Vientiane
9	Meeting with Mekong River Commission Follow up meeting with IUCN	Vientiane
10	Meeting with Burapha Consulting Company Field visit to a smallholder private forestry scheme	Vientiane Field visit
11	Report preparation	Vientiane
12	Report preparation	Vientiane
Monday 13	Report preparation	Vientiane
14	Report preparation	Vientiane
15	Report preparation	Vientiane
16	Debriefing at EC Delegation in Vientiane Submission of Aide Memoire to EC Delegation	Vientiane
17	Team departs Lao PDR	Lao PDR
18/19	Team arrives in Europe	Europe
19-30	Completion and submission of Draft Report	Europe
1st July	Debriefing with EC in Brussels	Brussels

Shaded areas indicate weekends

Appendix 3

List of Persons consulted

Appendix III. List of persons consulted

Francesco Straniero, Senior Project Officer, Delegation of the European Commission, Vientiane
Mel Jones, Senior Programme Officer, Delegation of the European Commission, Vientiane
Richard Brown, Consultant Infrastructure Engineer, Nam Theun 2 Power Company Ltd
Geraldine Zwack, Country Director, CARE International in Lao PDR
James Nugent, Country Director, ADB Lao PDR Resident Mission
Keu Moua, Project Implementation Officer, Environment and Natural Resources, ADB
Leena Kirjavainen, FAO Representative, Lao PDR
Thibault Ledecq, UN Volunteer, FAO Loa PDR
Gary Oughton, Resources Management Adviser, ECOLAO, Vientiane
Mike Callaghan, Consultant, ECOLAO, Vientiane
Murayama Hiroshi, Assistant Resident Representative, JICA, Laos Office
Kayasith Sadettan, Assistant Programme Officer, JICA Laos Office
Michael Poulsen, Natural Resources Management Specialist, Sustainable Forestry & Rural Development Project (SUFORD), Vientiane
Noriyoshi Kitamure, Senior Forestry Adviser, JICA, Dept of Forestry, Vientiane
Bryan Holford, Resident Process Adviser, UNDP Support to Governance and Public Administration Reform Project, Vientiane
Peter Edwards, Team Leader, Strengthening Environment Management through STEA Project, Vientiane
Frida Lindemalm, Consultant to STEA, (Ramboll Natura AB), Vientiane
Latsamay Sylavong, Lao Programme Manager, IUCN, Vientiane
Jean Foerster, Social & Environmental Director, Nam Thuen 2 Power Company Ltd (NTPC), Vientiane
Chris Flint, Manager: Social & Resettlement Division, NTPC, Vientiane
Enrique Crousillat, Country Manager, World Bank, Lao PDR Field Office
Ronald Isaacson, Deputy Country Director, World Bank, Lao PDR Field Office
Nat Pinnoi, Environmental Economist, World Bank, Bangkok Office
Hans Guttman, Programme Coordinator, Environment Division, MRC, Lao PDR Office
Peter Fogde, Forest Engineer/Director, Burapha Group, Vientiane
Phethsamay Vongkhammonety, Director General, Department of Forestry, Vientiane
Joost Foppes, Non Timber Forest Prodcts Project, SNV, Vientiane, Laos
Tomas Jonsson, Chief Technical Adviser, SUFORD, Vientiane, Laos
Dr. Soulany Chansy, HIV/AIDS Prevention and Care Project Manager, Lao Red Cross

Appendix 4

List of Documents Consulted

Appendix IV. List of Documents Consulted

ADB (2004) Country Strategy and Program Update, Lao PDR 2005-2006, ADB, Vientiane, August 2004

ADB (1997). National water sector profile Lao PDR. Unpublished draft. Asian Development Bank, Manila. 33 pp.

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Appendix 5

Curricula Vitae of the Consultants

Appendix V. Curricula Vitae of the Consultants

DOUGLAS CROSS
Environmental Analyst and Forensic Ecologist

Professional qualifications	BSc (Hons) Zoology, Physiology, Biochemistry, Southampton, UK, 1964 Postgraduate Diploma in Education and Vocational Training, Garnett College, University of London, UK 1969
Membership of Professional bodies	Chartered Biologist, Inst. Biology, UK European Professional Biologist, EPBA Committee on Toxicity of Chemicals in Foods, Consumer Products and the Environment, UK Govt Dept of Health
Nationality	British
Languages	English : Mother tongue French : Basic
Key experience	Senior Consultant and Mission Leader in EIA and SEA studies in many countries; Fisheries and Aquaculture Specialist; Compliance analysis of policies and projects; Expert Witness in forensic ecology in UK and overseas Courts, Tribunals and Public Inquiries

Career summary

1976 to 2005	Freelance Consultant in Environmental Analysis and Forensic Ecology
1974 – 1976	Principal Aquaculture Consultant, Fisheries Development Ltd, London.
1969 – 1974	Lecturer in Applied Ecology, University of Coventry, UK
1966 – 1968	Fish toxicologist, Water Pollution Research Lab. Stevenage, UK
1964 – 1966	Fisheries Officer, Cornwall River Authority, UK
1958 – 1960	Medical Radiographer, Royal Army Medical Corps.
1954 – 1958	Analytical chemist, National Physical Lab, Teddington, UK

Employment locations

Bangladesh, Brazil, Cambodia, China, Egypt, Greece, French Guiana, The Gambia, India, Iraq, Republic of Ireland, Italy, South Korea, Lao PDR, Lesotho, Malaysia, Malawi, Mali, Mexico, Montenegro, The Netherlands, Pakistan, Philippines, Russia, Spain, Suriname, Swaziland, Tibet, Tuvalu, UK, US, Vietnam, Yemen.

STEPHEN CHARLES DEVENISH

Forestry, Environment and Sustainable Development

Professional Qualifications	BSc (Hons) Forestry & Wood Science, University College of North Wales, Bangor Wales, UK, 1974 MSc Sociology & Economics, Imperial College of Science & Technology, University of London, 1975 DIC Diploma, Imperial College Postgraduate Forestry Planning Course, Oxford Forestry Institute,, University of Oxford, UK 1986
Membership of Professional Bodies	Commonwealth Forestry Association Institute of Chartered Foresters Strategic Planning Society
Nationality	British
Languages	English : Mother tongue Spanish : Good
Key experience	Project preparation and management Natural resource management Sustainable forest management Poverty alleviation programmes Integrated rural development

Career summary

1997 - to date	Freelance Forestry & Environment Consultant.
1993 - 1997	Principal Forestry Development Consultant, Landell Mills Management Consultants Ltd, Bath, UK
1991 - 1993	Freelance Forestry & Environment Consultant
1986 - 1991	Principal Forester, Arjo Wiggins Appleton Ltd, UK
1986	Senior Lecturer, Centre for International Briefing, UK
1984 - 1986	Forest Management Officer, Forest Service, Vanuatu
1981 - 1984	Management Services Adviser, Fiji Pine Commission
1980 - 1981	Field Director, VSO, Pacific Office, Fiji, South Pacific
1979 - 1980	Principal Planning Officer, Merseyside Council, UK
1976 - 1979	Assistant Conservator of Forests, Malawi, Africa.

Employment locations

Bangladesh, Brazil, Cambodia, China, Corsica, Czech Republic, Fiji, France, Germany, Ghana, Guyana, Indonesia, Ireland, Italy, Lao PDR, Madagascar, Malawi, Mozambique, Myanmar, Pakistan, Philippines, Poland, Portugal, Romania, Samoa, Slovenia, Spain, South Africa, Tonga, Thailand, Turkey, UK, USA, Vanuatu, Venezuela and Vietnam.

Appendix VI

Terms of Reference

Terms of Reference

Country Environmental Profile of Lao PDR

1. Background

Lao PDR is a landlocked country with a population of 5 million, growing at a rate of 2.4% per year, and a population density of only 22 people per km^2. With a per capita income at US$350 in 1999, Lao PDR ranks lowest amongst the Southeast Asian and Pacific countries in terms of the UN Human Development Index. Poverty is particularly associated with ethnic minority groups living in the uplands areas of the country, particularly in the north.

Since 1996, the Government has progressively introduced elements of deregulation, liberalisation and privatisation. However, the Government's response to the Asian financial crisis, unfolding in 1997, created macro-economic instability and seriously affected public finances. In mid-1999, the Government embarked on a strong stabilisation programme, supported by the IMF. With restrained fiscal and credit policies, macroeconomic management improved markedly in 2000.

The economy of Lao PDR is still dominated by agriculture, which accounted for 52% of GDP in 1998, and is the source of employment for approximately 80% of the population. In the 1990s, there has been a gradual structural change in the Lao PDR economy towards industry. Textiles and garments is the leading industrial growth sector.

Acceleration of environmentally sustainable rural development will be crucial in addressing the wide-spread rural poverty in Laos. Given the number of poor people living in rural areas and the problems of the uplands with difficult access to remote areas in great need of basic services, this is a formidable challenge.

Current Environmental Trends

The State of the Environment report of 2001 (STEA, 2001) identifies five areas of environmental concerns:

- Deforestation and forest quality Degradation: Forest overage have been declining steadily from more than 70 per cent of the total land area up to the mid

  1960s to about 47 per cent in 1998, the Department of Forestry is in process of determining trends since 1998 base on the satellite date collected during 2000-02 Rural people, who comprise 80 per cent of the population, are generally highly dependent on forests,

especially as sources of food, raw materials, revenue and traditional medicines, villagers may obtain half of their income and half of their dietary protein from forest products. Forest degradation is highly detrimental. The effects are specially sever for the poorest segments of the population, particularly women and ethnic groups, whose livelihood are often closely tied to the health of the surrounding forest.

- Land Degradation: Swidden or dry - rice cultivation, with lower yields, id predominantly practiced by poor villagers living in the highland area. More than one – third of the country area has a slope of more than 30 per cent. Cultural and ethnic diversity pray and major role in determining the type of agriculture practices.

- Access to water Resources: Although Lao PDR has the highest per capita renewable freshwater resources in Asia, only 60 per cent of the urban and 51 per cent of the rural population has direct access to a good water supply, only 35 per cent of the cultivated land has access to irrigation.

- Threats to Bio-diversity: Deforestation and forest quality degradation have adversely contributed to Bio-diversity losses over the past three decades. Unsustainable forest management, wildlife, excess and inappropriate fishing, and growing demand for agricultural and residential areas also lead to Bio-diversity losses.

- Decline in Urban Environment: proper planning is needed in providing urban services to avoid exacerbating pollution and affecting negatively the well-being

  of the Urban population. Solid west and wastewater management will receive further attention.

Government policy

The Gouvernment has included The National Environmental Action Plan 2000and Environment Strategy for 2003-2020 in the National Growth and Poverty Eradication Strategy 2004. The eradication of slash and burn cultivation throughout the country is one priority . This has a significant effect on the livelihoods of upland villagers dependent on slash and burn cultivation of rice. Traditional patterns of village livelihood relied on forest products as a food reserve during years of poor rice harvest and as a regular source of fruits and vegetables. Onother priority is the preservation of valuable hardwoods for commercial extraction and the protection of the forest environment. This should take into account the international concern about environmental degradation and the loss of many wildlife species unique to Laos.

2. Objective

The objective of a Country Environmental Profile is to identify and assess environmental issues to be considered during the preparation of a Country Strategy Paper which will directly or indirectly influence EC cooperation activities.

The Country Environmental Profile will provide decision-makers in the partner country and in the European Commission with clear information on the key environmental challenges and actors, as well as strategies and programmes designed to address them. This information will ensure that the EC cooperation strategies for the period 2007-2013 systematically integrate environmental considerations into the selection of priority focal areas and also establish the necessary environment safeguards for all cooperation activities undertaken in the Country.

The Profile will establish the key linkages between the environment and poverty reduction. It will constitute an important source of baseline information and contribute to focusing political dialogue and cooperation with the Country on key areas of concern such as sustainable development as well as raising awareness among policy-makers.

3. Results

The assessment will deliver the following results:

- An assessment of the environment identifying key environmental factors influencing the Country's development and the responses to these.
- An assessment of national environmental policy and legislation; institutional structures and capacity, and the involvement of civil society in environmental issues.
- An assessment of past and anticipated future tends of environmental indicators.
- An overview of past and ongoing international cooperation in the environment sector.
- Recommendations and, as far as possible, guidelines or criteria for mainstreaming environmental concerns in priority development areas. These recommendations should support the preparation of the Country Strategy Paper and, as far as possible, include guidelines or criteria to be used for environmental mainstreaming in subsequent phases of the operation cycle.

4. Issues to be assessed

The consultants will assess the following issues:

4.1. The state of the environment

Including key issues (current status, pressures and trends) and environmental performance in meeting objectives/plans and targets in the following areas:

- **Physical environment** including climate (and climate change issues), air quality, water quality and resources (including the marine environment), land quality and resources and natural disaster risks.
- **Biological conditions, biodiversity, ecology and nature conservation** including rare, endangered and endemic ecosystems, habitats and species, and biological resources of cultural, social, or economic importance.
- **Socio-economic conditions, socio-cultural conditions and human health,** especially socio-economic conditions in relation to environmental issues (public health, vulnerability to disasters, access to natural resources and commodities); other issues should include, as relevant, development and sustainability of Eco-Tourism activities, archaeology and cultural heritage, values and aspirations, recreational, landscape and visual aspects.

Reference should be made to local and internationally recognised environmental indicators and quality standards to establish a consistent basis for comparison of environmental and sustainable development performance. The indicators selected should facilitate future monitoring and evaluation of the extent of environmental integration and be useful for future environmental assessments. Particular attention should be paid to the rate of change of indicators where information is available.

The causes of the environmental situation and trends and their consequences on human well-being and sustainable development should be presented.

If appropriate, the information could be organized according to eco-geographical subdivisions with the scale (regional, national, local) of the issues indicated.

4.2. Environmental policy and legislation

A brief description and a review of strengths and weaknesses of the following:

- National policies, environmental strategies and action plans.
- Legislation, current and in preparation, by the (National Institution) covering development control, requirements for EIA/SEA, environmental auditing, sustainable use or conservation of natural resources, pollution control, land tenure and land reform. The effectiveness of legislation enforcement. The provision for public participation in environmental issues, procedures for public participation in development control and environmental planning and public access to environmental information.
- National approaches to key international or regional environmental conventions such as those concerning climate change, biodiversity and desertification.

4.3. Environmental institutional framework

- The institutional structures and responsibilities of the authorities dealing with environmental issues in policy making, legislation, planning, environmental protection, monitoring and enforcement.
- The capacity and financial resources of authorities responsible for environmental management.
- The extent and quality of protected areas (and, if relevant, other land use measures).

4.4. Integration of environmental concerns into the main sectors

The assessment should examine the integration of environmental concerns in the following sectors (*as appropriate*):

- agriculture, fisheries and forestry;
- industry, and mining;
- Hydropower projects with important environmental impact;
- services including transport, utilities (power, energy and water) and tourism

For the purposes of the main focal areas of the country strategies for 2007-2013, special attention should be given to mainstreaming environmental concerns into the areas of rural development, private sector development, public finance management, and social policies (health and education)[1].

4.5. EU cooperation with the Country from an environmental perspective

This should cover experience relating to interventions with specific environmental objectives as well as the integration of environment into other programmes, including the application of environmental assessment procedures. Where information is available the environmental impacts of EU cooperation or potential risks should be identified for the benefit of future programmes. Lessons should be drawn from the existing evaluations.

4.6. Cooperation funded by other agencies from an environmental perspective

This should cover involvement of other funding agencies and their experience in the Country and include a list of recent and planned projects/programmes, with an environmental focus or anticipated impact.

[1]The list of sectors outlined herewith is indicative and provisional, as the main thrust of the EC support for Lao PDR under the CSP 2007-13 is not yet decided

5. Conclusions and recommendations

The key aspects of the state of the environment in the Country including policy and institutional constraints and challenges should be clearly stated. This should be presented in a matrix, crossing environmental concerns and sectors (or sets of activities).

Based on a comprehensive assessment of available information and consultation with stakeholders recommendations on how best to address environmental issues should be elaborated. Individual recommendations should be clearly articulated, justified and grouped according to type. In developing recommendations existing Country Strategy Papers provide general guidance on the style and detail required.

The relative priority of the recommendations and an indication of the challenges to their implementation should be given.

Recommendations are likely to cover direct environmental interventions as well as the provision of environmental safeguards for other activities.

Recommendations should also be made as to how best the Commission can mainstream environmental issues into the next cycle of country strategy papers.

The constraints to preparing the profile caused by limited information should be described, and an evaluation of the need for additional studies, such as Strategic Environment Assessments or others, should be made.

6. Work plan

The work plan should include but not necessarily be limited to the following activities:

- Consultation with EC country desk officers and other relevant officials, EC Delegation in the Country, a selection of national and local authorities, key international funding agencies operating in the Country, plus key national, international civil society actors operating in the environmental field.
- Review of previous Country Environmental Profiles, or studies, and Country Strategy Papers, produced either by the EC or other international organisations such as the World Bank, ADB, UNEP etc; evaluation reports with respect to environmental issues on development and economic co-operation produced by government, EC or other agency sources.
- Review of environmental literature, evaluation reports, environmental policy and legislation framework, legislation and regulations and enforcement relating to environmental issues, action plans, and progress in implementation.
- Review of environmental performance indicators selecting appropriate indicators from those suggested by organisations such as EEA/OECD/Eurostat.

- Field visits to sites of key environmental concern and (if possible) the organisation of a national workshop that national authorities, donors, experts and civil society representatives should be invited with the aim of identifying and attempting to obtain a consensus on key environmental concerns. .

On the basis of the proposed work plan and time schedule outlined in these Terms of Reference, the consultants should provide a detailed work plan in their offer.

7. Expertise required

The proposed mission shall be conducted by a team of *two* experts who should have the following profile:

- Expert level II with at least 10 years wide experience in environmental issues, including institutional aspects; international environmental policies and management; environmental assessment techniques and experience in rapidly assembling, assessing information and developing recommendations. He/she would be the team leader
- Expert level II with 10 years experience with an environment background complementary with the team leader's one.

In addition:

- Previous working experience in Lao PDR or the region is requested for at least one team member ;
- Experts should have an understanding of the EU environment and development policies;
- Experience in undertaking environmental analysis and preparation of development programmes would be an asset;
- Familiar with Commission Guidance on Programming including Development Policy, Country Strategy, PCM, Policy Mix and integration of environmental issues into other policy areas;
- Experience of participatory planning processes;

The experts should have excellent skills in English with knowledge of French. These languages will be the working languages although the final report must be presented in English only. Knowledge of Lao will also be an advantage.

For each specialist proposed, Curriculum Vitae must be provided of no more than four pages setting out the relevant qualifications and experience.

8. Reporting

The study conclusions must be presented in the Country Environmental Profile report in the format given in Appendix 1.

The draft report in 10 copies plus an electronic version is to be presented to the Head of Unit for Southeast Asia in the DG for External Relations of the European Commission by mid-July 2005 at the latest. Within 5 weeks, comments on the draft report will be received from the EC.

The consultants will take account of these comments in preparing the final report (maximum 40 pages excluding appendices). The final report in English in 50 copies plus an electronic version is to be submitted by end August 2005.

9. Presentation of the offer

The consulting firms should present their offer by providing the two CVs of the experts (not more than 4 pages each), and the proposed methodology (not more than 4 pages).

10. Time schedule

	Expert II	Expert II
Desk analysis. Including briefing by one expert in Brussels – *May 2005*	*6*	*4*
Field phase including travel and possible workshop	*17*	*17*
Report finalisation	*3*	*3*
Debriefing in Brussels-not later than *mid-July 2005*	*1*	
Final report *end August 2005*	*1*	*1*
Total days	*28*	*25*

11. Appendices

I. Report format for a Country Environmental Profile

Standard Report Format

Report Format for a Country Environmental Profile

Maximum length (excluding appendices) 40 pages.

The following text appears on the inside front cover of the report:

This report is financed by the European Commission and is presented by [name of consultant] for the ... (National Institution) and the European Commission. It does not necessarily reflect the opinion of the ... or the European Commission.

1. Summary

This is an executive summary of the key chapters of the Country Environmental Profile clearly indicating priority challenges and areas for action at the country level.

2. State of the environment

This chapter will provide an overview of the context and general state of environmental conservation and management in the Country – including questions of fundamental rights and indigenous rights. More specifically, it will include analysis of the:

- Physical environment;
- Biological conditions, biodiversity, ecology and nature conservation;
- Socio-economic and socio-cultural conditions and human health;

This chapter will also set out an assessment of the state of the environment including key issues as outlined in Section 4.1 of the TOR.

3. Environmental policy, legislative and institutional framework

This chapter will provide an assessment of the Country's environmental policy, regulatory and institutional framework for pollution control, natural resource use and sustainable development. It will be divided into sections as follows:

3.1. Environmental policy and legislation

This chapter must include an assessment of the key issues outlined in Section 4.2 of the TOR.

3.2. Environmental institutional framework

This chapter should review the roles and capabilities of the main national institutions as outlined in Section 4.3 of the TOR.

3.3. Integration of environmental concerns into the main sectors

This section must include an assessment of the key issues as outlined in Section 4.4 of the TOR.

4. EU and other donor cooperation with the Country from an environmental perspective

This section must include EC and other donor assistance within the Country from an environmental perspective covering the issues outlined in Sections 4.5 and 4.6 of the TOR.

5. Conclusions and recommendations

This chapter will present the conclusions on the state of the environment in the Country and make recommendations for priority actions. The key environmental issues identified during the assessment should also be presented in a summary table form. Recommendations will also be made as to how best the Commission can mainstream environmental issues into the new country strategy papers.

6. Technical appendices

I. Environmental maps of the Country

II. Reference list of environmental policy documents, statements and action plans, and other relevant technical information.

7. Administrative appendices

I. Study methodology/work plan (1–2 pages)

II. Consultants' Itinerary (1–2 pages)

III. List of persons/organisations consulted with their affiliation and contact details (1–2 pages)

IV. List of documentation consulted (1–2 pages)

V. Curricula vitae of the consultants (1 page per person)

VI.Terms of Reference for the Country Environmental Profile