ADB, GEF, UNEP

in collaboration with IGES and NIES

National Performance Assessment and Subregional Strategic Environment Framework in the Greater Mekong Subregion

ADB T.A. No. 6069-REG

LAO P.D.R.
NATIONAL ENVIRONMENTAL PERFORMANCE ASSESSMENT (EPA) REPORT

Prepared by

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For Asia and the Pacific

March 2006

EXECUTIVE SUMMARY

1. The increasing pace of economic activity in Lao PDR during the last decade or so has inevitably had an impact on the country's natural environment. The 2001 National State of Environment reports continuing deterioration of several key environmental parameters including forest cover, biodiversity, land management as well as urban environmental issues. The present document is a systematic assessment of the degree of success that national stakeholders have had in achieving stated objectives of environmental policy. The assessment is limited to eight environmental concerns identified as most pressing in Lao PDR and is backed by detailed and transparent statistical information.

2. Forest and water are key development resources for Laos. Seventy percent of Lao PDR was under forest sixty years ago. In the course of the past three decades, much of existing accessible forest in Laos was significantly degraded. The annual rate of deforestation averaged about 0.3% of the total country land area. Shifting cultivation and inappropriate farming practices in the uplands, over-logging, and absence of a well developed forest management planning system were among the contributing factors. The government policy of land allocation to upland households has helped reduce the pressure on the forest resource especially during the last five years or so. The forest cover has stabilized around 42 per cent of the total land area but the quality of the remaining forest appears to be further deteriorating.

3. Lao PDR's geography and topography creates wide variations in climate, soils, and ecological niches, leading to locally adapted and diverse biota. WWF identified 200 eco-regions worldwide and four of them are located in Lao PDR. However, the quality of Laos' forests and their potential for biodiversity conservation has been declining steadily during the past several decades. The Government, aided by the international community, has created the National Protected Area System. The degree of effective protection within the protected realm, however, is relatively low. This, plus the fact that not all of the designated protected areas were in good condition to start with, has lowered the effectiveness of the Government's countermeasures. Related to forest and biodiversity protection is the issue of land degradation. Lao Government's policies have contributed to reducing the extent of slash-and-burn farming but the long-term impact of these measures on the conditions of land is yet to be established.

4. Water may well be Lao PDR's principal asset with a potential to support socio-economic development, especially the hydropower and irrigation sub-sectors. It also supports fisheries, a key source of livelihood and protein for the Laotian people. Aquaculture and capture fisheries have contributed significantly towards food security and income generation, especially in the rural areas where 85% of the population lives. Total fish output during the last decade comfortably outstripped the growth of the population. The sustainability of this achievement needs confirmation.

5. There has been a significant increase in the percentage of rural population with access to safe potable water between 2002 and 2004. Access in urban areas, on the other hand, has not kept up with the migration-assisted growth in urban population.

6. Solid waste management has improved in the principal towns of Lao PDR during the past decade. Information is insufficient to say how the rest of the country has performed. Management of hazardous waste has been handicapped by poor knowledge of the underlying situation. Thirty years after the end of hostilities in Indochina the problem of unexploded ordinance is far from solved despite steady efforts of the Lao authorities to deal with it.

7. Lao PDR does not contribute significantly to the overall quantity of greenhouse gas emissions even though it is a net GHG emitter. Its ratification of the UNFCCC in January 1995 had primarily symbolic and political value.

Abbreviations

ADB	Asian Development Bank
ARCBC	Asian Regional Centre for Biodiversity Conservation
BOD	biological oxygen demand
BOL	Bank of Laos
CPI	Committee for Planning and Investment
CPC	Committee for Planning and Cooperation
CCM	Coordination Committee Member
CO_2	Carbon Dioxide
CH	Methane
CO	carbon monoxide
CFCs	chlorofluorocarbons
DAFO	District Agriculture and Forestry Office
DoF	Department of Forestry
DoE	Department of Environment
DoA	Department of Agriculture
DGM	Department of Geology and Mine
DOI	Department of Irrigation
DFRC	Division of Forest Resources Centre
DHUD	Department of Housing and Urban Development
DoT	Department of Transport
DoP	Department of Plant
EPA	Environmental Performance Assessment
ERI	Environmental Research Institute
EIA	Environmental Impact Assessment
EA	Environmental Assessment
ED	Environmental Department
FAO	Food and Agriculture Organization of the United Nations
FY	fiscal year
FLMEC	Forests of the Lower Mekong Ecoregions Complex
GMS	Greater Mekong Sub-region
GEF	Global Environment Facility
GHG	greenhouse gases
Gg	giga gram
GDP	gross domestic product
GoL	Government of Laos
IUCN	The World Conservation Union
ICDPs	Integrated Conservation and Development Projects
IWM	Integrated Watershed Management
IEE	Initial Environmental Examination
JICA	Japan International Cooperation Agency
LECS	Lao Expenditure and Consumption Survey
LA	land allocation
LUP	land use planning
LARReC	Living Aquatic Resource Research Centre
LWU	Lao Women's Union
LYO	Lao Youth Organization
MDG	Millennium Development Goal
MOH	Ministry of Health
MAF	Ministry of Agriculture and Forestry

MCTPC	Ministry of Communication, Transport, Post and Construction
MFA	Ministry of Foreign Affaires
MIC	Ministry of Information and Culture
MPH	Ministry of Public Health
MOC	Ministry of Culture
NAFRI	National Agriculture and Forestry Research Institute
NBSAP	National Biodiversity Strategy and Action Plan
NAFES	National Agriculture and Forestry Extension Service
NBCAs	National Biodiversity and Conservation Areas
NPA	National Protected Areas
NSC	National Statistics Center
NGO	Non Governmental Organization
NIP	National Implementation Programme
N_2O	Nitrous Oxide
NGPES	National Growth and Poverty Eradication Strategy
NEQMP	National Environmental Quality Monitoring Program
NUoL	National University of Lao PDR
P-S-R	Pressure-State-Response
PM	Prime Minister
POPs	persistent organic pollutants
PCBs	polychlorinated biphenyls
PRC	People Republic of China
PMO	Prime Minister's Office
PSTEO	Provincial Science Technology and Environment Office
RDP	Regional Development Committee
SEF	strategic environment framework
STEA	Science Technology and Environmental Agency
SEM	Strengthening Environmental Management
SoE	State of Environment
TA	Technical Assistance
UNCDF	United Nations Capital Development Fund
UNCT	United Nation Country Team
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UXO	unexploded ordnance
VCHS	Vientiane Capital Health Service
WASA	Water Supply Authority
WHO	World Health Organization
WCMC	World Conservation Monitoring Centre
WRCC	Water Resource Coordination Committee
WFP	World Food Program

Note: Exchange rate (January 2006): 1 US dollar = 10,500 Kip

Contents

I. INTRODUCTION

8. The state of Lao PDR's environment and its changes present a number of challenges to the country's authorities and its population. The 2001 National State of Environment reports continuing deterioration of several key environmental parameters such as biodiversity, forest cover, land productivity as well as growing importance of urban environmental concerns. Adequate understanding of the underlying trends, the principal factors that contribute to them and the impact of countervailing measures facilitate the formulation of effective responses.

9. The National Performance Assessment and Sub-regional Strategic Environment Framework for Greater Mekong Sub-region (the "SEFII Project") that is at the origin of the present report is the latest in a series of environmental initiatives undertaken under ADB's Greater Mekong Sub-Region (GMS) umbrella. Its aim is to go beyond simple exchange of environment-related data within GMS or more complete descriptions of the state of the environment of GMS member countries, the focus of earlier GMS projects and other donor-financed activities. Instead, the objective is to assess the performance of "environmental managers" in the most pressing areas of concern such as those mentioned above. In an interdependent economy, the category of "environmental managers" includes not only the country's environmental authorities but also the mainstream line agencies and all those whose decisions have a bearing on environmental outcomes.

10. Supported by carefully constructed statistical indicators structured to fit a Pressure-State-Response (P-S-R) framework, an attempt is made to draw a broad picture of performance during the past decade and use it as a tool of learning, policy adjustment and public accountability. Performance is understood to be a comparison of outcomes against existing policy targets. The assessment looks at what has happened, not at what might happen in future. In principle, an Environmental Performance Assessment (EPA) can be undertaken at any scale (national, local, project, sub-regional). The present report is a national EPA.

11. This EPA report has three main sections in addition to this introduction and an appendix linked to the text and containing the statistical information underpinning the assessment. Part II deals with past performance under principal environmental concerns. The selection of concerns for analysis was made early on in the project's implementation. Part III looks at factors affecting performance that cannot easily be assigned to any of the concerns selected in Part I. Part IV contains conclusions and recommendations.

12. The report is intended not mainly for a specialized environmental audience but also for many others whose decisions and understanding of issues are vital for Lao PDR's success in sustaining recent fast rates of economic growth and doing it with fewer adverse consequences for the country's environment.

13. The EPA report was prepared under the guidance of senior staff of STEA, namely:

Mr. Noulinh Sinbandhit	Vice President of STEA
Mr. Soukata Vichith	Director General of Environment Department, STEA
Ms. Keobang A Keola,	Deputy Director General of STEA Cabinet and the SEF II National Focal Point
Ms.Monemany Nhoybouakong	Acting Director General of ERI
Mr. Phonechaleun Nonthaxay	Deputy Director General of ERI
Mr. Singsavanh Singkavongxay	Director of Environment Data Centre, and the National Project Coordinator, ERI/STEA

14. The principal author of the reports was:

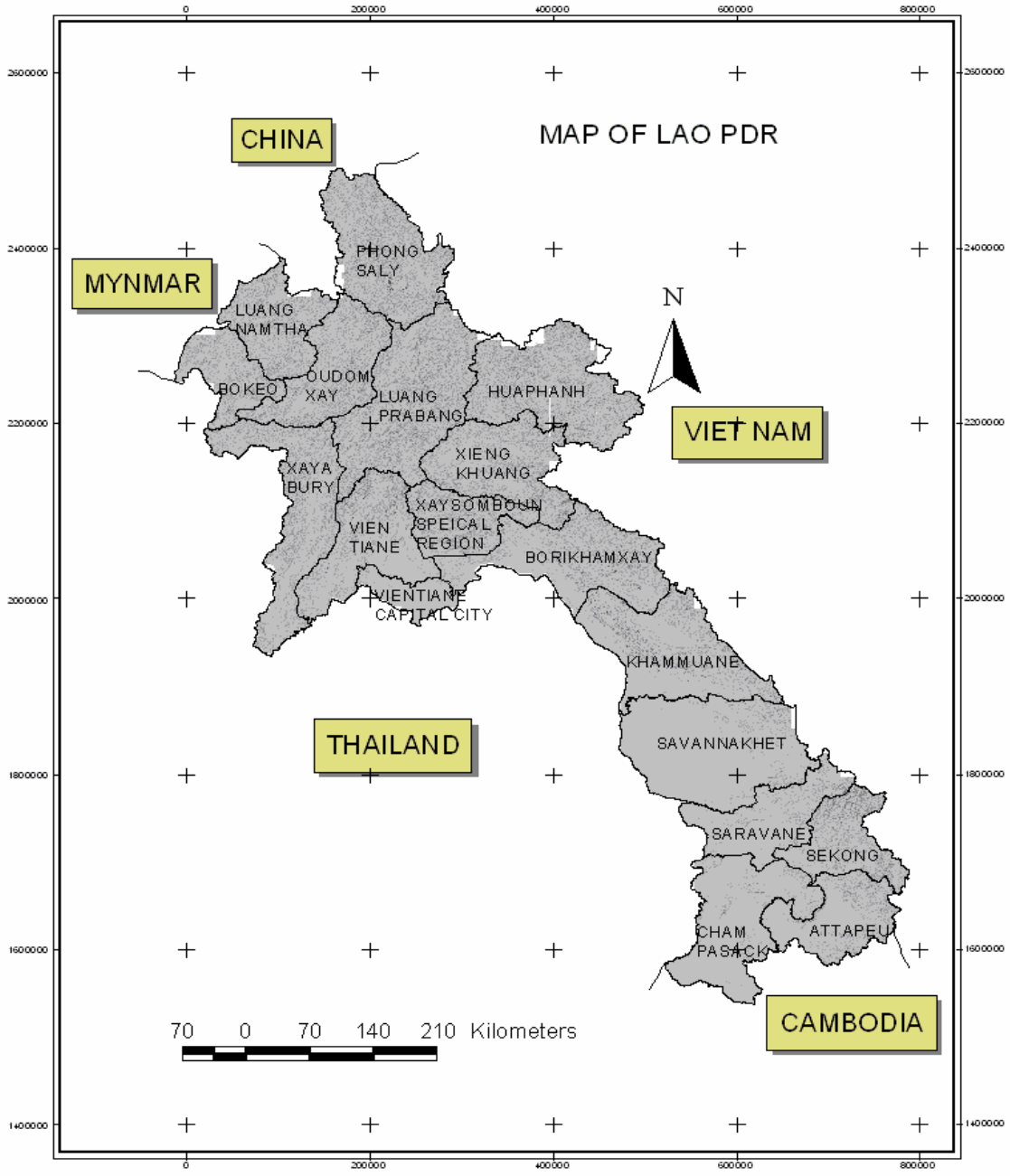
Mr. Bounheuang Phanthasith,	Domestic Consultant on Environmental Issues

15. An EPA technical review panel was constituted for the Project. It consisted of:

Mr. Singha Ounnignom	Director of Water Resource Development Division, Lao National Mekong Committee Secretariat
Mr. Somboun Khantivong	Director of Social Population Planning Division of Committee for Planning and Investment (CPI)
Mr. Bouaphanh Phanthavong	Chief of Technical Unit, Department of Forestry, (MAF)
Mr. Somnuk Chanthaseth	Deputy Director of Technical Division, Department of Irrigation (MAF)
Mr. Khamphoui Sivongxay	Deputy Director of Environment Data Centre, ERI/STEA
Mr. Aphisayadeth Insisiengmay	Director of Urban Planning Division, Department of Housing Urban Planning, (MCTPC)
Mr. Singsavanh Singkavongxay	Director of Environment Data Centre, ERI/STEA and the National Project Coordinator

16. The report was reviewed by the sub-regional expert group and edited by international consultants, Messrs. Mike Comeau, Mohit Kumar and Ivan Ruzicka.

Map 1: The provinces of Lao PDR

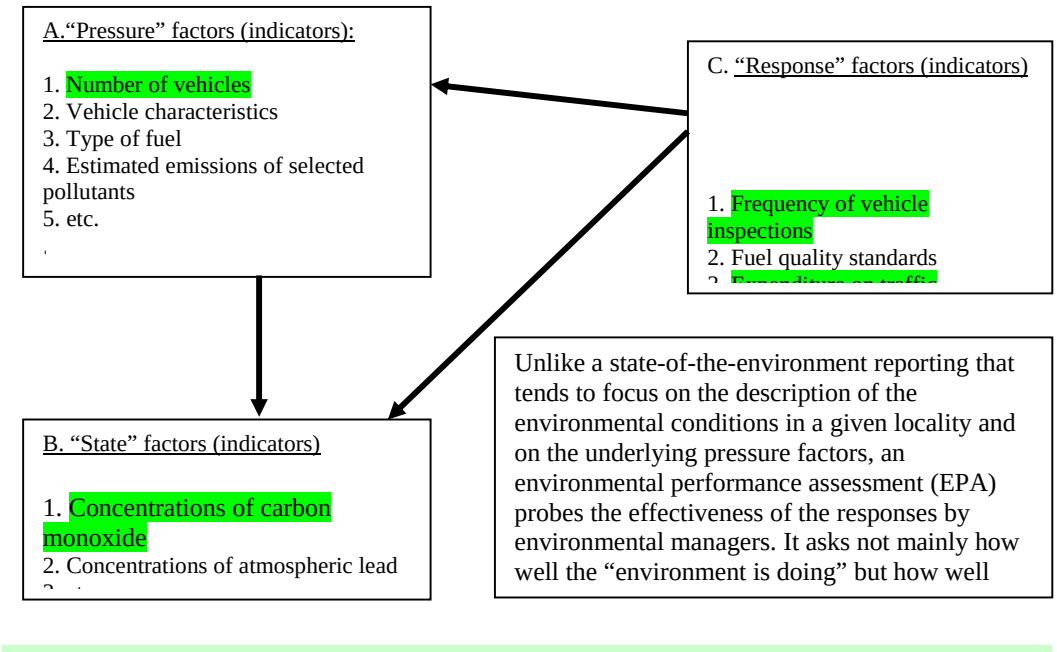


The approach

17. The pattern and urgency of environmental concerns varies from area to area and country to country. A prioritization of concerns is therefore needed to give the EPA a focus and stop it from becoming unnecessarily long. Following a wide-ranging internal consultation, the following eight concerns were chosen for the Lao National EPA out of a total of thirteen, i.e. (1) Forest resources, (2) Water resources (3) Fish resources (4) Threat to biodiversity, (5) Land degradation, (6) Inadequate solid waste management, (7) Inadequate hazardous waste management, and (8) Climate change.

18. The approach to assessing performance under each concern is anchored in a Pressure-State-Response model that logically links the sources of environmental problems (the "pressure" factors) with the resulting "state" of the variables of concern, and the policy and institutional "responses" intended to influence the pressure factors and through them, the state. Thus in dealing with surface water quality, for instance, different effluent discharges are the pressure factors, the concentrations of BOD, SS etc. are the state variables and the expenditure on wastewater treatment is one of the response factors. The desired values of the state variables typically (but not always) feature in governments' plans and strategies. The assessment of performance is a matter of judging how successful the responses adopted have been in reaching the target values of state (and/or pressure) variables. The process is depicted in Figure 1.1 below:

Figure 1.1: Simplified representation of a P-S-R model (hypothetical example of air quality management with four indicators of performance, highlighted in green)



19. In many situations, the number of pressure factors, state variables and types of responses will be large. Complex inter-relationships will often exist among them. Full analysis of each concern is demanding and many specialists devote their time to describe selected segments of the P-S-R "circle" (without necessarily using the P-S-R terminology). At the same time, there is a clear need for a simplified picture of "what is going on" if national environmental authorities are to communicate with others in positions of influence and the public at large. The simplification is a matter of selecting only the most telling of the P, S, and R factors and using them as indicators of past trends and through them performance. Inevitably, the simplification results in some loss of accuracy but provided care is taken, the essence of the message is not lost. The indicators become points of reference. Ideally, they remain in policy-makers' sights for a long time supporting repeated assessments of performance (e.g. every 3-4 years)

The assessment method used

20. At the same time, there is a clear need for a simplified picture of "what is going on" if national environmental authorities are to communicate with others in positions of influence and the public at large. The simplification is a matter of selecting only the most telling of the P, S and R factors and using them to describe past trends, and through them, performance. The selected variables then become environmental indicators. Suitably analyzed, they then facilitate the assessment of performance.

21. The P, S and R indicators' values are the raw material of the EPA. The statistical background of each indicator is summarized in indicator "factsheets" and these are attached to the report to give the reader an opportunity to judge the underlying basis of the assessment. The assessment itself is a matter of rating (a) individual indicators and (b) the overall performance –an interplay of all indicators-- under the concern being studied. A rating structure has been developed for this purpose.

22. A double-word description is utilized to rate each indicator. The first word describes the magnitude of the indicator relative to some benchmark (such as an international standard, an average for several countries etc.). The second word describes the observed trend of the indicator value, as depicted by long or short-term historical data. The magnitude and the trend keywords are typically combined (e.g. "relatively poor and deteriorating"). In the case of baseline indicators with only one or few observations, the trend-keyword (and the "and" conjunction) are omitted. The descriptions applied to each class of indicators are contained in Tables 1.1 to 1.3 and the rating applied to each concern is given in Table 1.4.

Table 1.1: Rating Criteria Utilized to Assess State Indicators

STATE INDICATORS			
In order to qualify the magnitude of the state indicator using the recommended keywords below, the values of the state indicator are compared against known benchmark figures. The national policy target for the indicator is one such possible benchmark. In many cases, a GMS average values or an international standard would be more suitable if the indicator is to tell us something about the relative performance of each GMS country. If no such figures exist, the magnitude keyword is omitted. The "poorness" or "goodness" of the magnitude is dependent on the interpretation of the indicator value. In some cases a high state indicator value is "good" (e.g. % forest cover); at other times a low value is preferred (e.g. # threatened species). The trend of the State indicator is easy to rate as either deteriorating, stabilizing or improving, provided it is based on long-term historical data. In other cases or for benchmark indicators, the indicator value may not show any trend at all, in which case the trend keyword is left blank or specified as "Undetermined Trend".			
Relatively Poor and ….	**Average** and ...	**Relatively Good** and ….	**Unknown State** and ….
As evidenced by an indicator value which is far below (or far above)	As evidenced by an indicator value which is close to the same	As evidenced by an indicator value which is far above (or far below)	This rating is used if the value of the indicator cannot be compared

the same indicator value for other GMS countries or far below (or above) other benchmark figures such as international standards or national targets	indicator value for other GMS countries or within the range of other acceptable benchmark figures such as international standards or national targets	the same indicator value for other GMS countries or far above (or below) other benchmark figures such as international standards or national targets	against the value of the same indicator in other countries or regions and there are no other benchmark figures, such as international standards or national targets
Deteriorating	**Stabilizing**	**Improving**	**Undetermined Trend**
As evidenced by a steady long-term deteriorating trend and with no immediate signs of improvement.	As evidenced by a steady long-term deteriorating trend but with short-term signs of leveling or even improvement, or a long-term level trend.	As evidenced by a long-term deteriorating trend but with sure signs of improvement based on more than one observation in the positive trend.	This rating is used if the selected indicator is inconclusive in terms of long or short-term trends or if the indicator is based on a single observation over time.

Table 1.2: Rating Criteria Utilized to Assess Pressure Indicators

PRESSURE INDICATORS			
There will always be some magnitude of pressure and the trend over time can simply be rated as increasing or decreasing. Qualifying the magnitude of the indicator value may at times be difficult, especially if the pressure indicator is unique to one country and no comparative figures are available from other countries. It is also unlikely that international benchmark figures will exist for pressure indicator. Judgment is required to rate the magnitude of unique pressure indicators. The trend of pressure indicators should be easy to rate, provided that long-term historical data exists. If only one or few observations exist, the trend keyword can be left blank.			
High and	**Medium** and	**Low** and	**Non-Comparable** and
As evidenced by the value of an indicator which is much higher than the value of the same indicator in other GMS countries or much higher than other benchmark figures, such as international standards or national targets	As evidenced by the value of an indicator with a value more or less equal to that of other GMS countries or other benchmark figures such as international standards or national targets.	As evidenced by the value of an indicator which is much lower than the value of the same indicator in other GMS countries or much lower than other benchmark figures, such as international standards or national targets.	This rating is used if, through lack of comparative numbers or other information, an order of magnitude cannot be assigned to the value of the indicator.
Increasing	**Steady**	**Decreasing**	**(blank)**
As evidenced by a long-term trend of increasing pressure, with very little sign of relief or stabilization.	As evidenced by a long-term steady or near-constant pressure that shows no sign of increase or decrease in the past or future.	As evidenced by a long-term trend of declining pressure, with perhaps fluctuating short-term oscillations.	The keyword is left blank if there is only one observation, or if there is no observed trend over time in the indicator value.

Table 1.3: Rating Criteria Utilized to Assess Response Indicators

RESPONSE INDICATORS			
Since responses tend to be very diverse, there may be few benchmarks to rate the magnitude of response indicators other than the national targets for the indicator selected. Once more, judgment is required to rate the magnitude of unique indicators to say how “big” or “small” the response was.			
Low and	**Average** and	**Significant** and	**Non-Comparable**
If the magnitude of the response is significantly below the national target or below the average in other GMS countries or other comparable	If the magnitude of the response is in line with national targets or the average responses of other GMS countries or comparable regions.	If the magnitude of the response exceeds national targets of the average of other GMS countries or comparable regions.	This rating is used (or the keyword left blank) if there are no data or information to compare the magnitude of the response with, or there

regions.			are no other benchmark figures.
Sporadic	**Intermittent**	**Consistent**	**(blank)**
If the response has been irregularly applied over time with no set program or budgets to continue the response in the future.	If the response has not been consistently applied but there are programs and budgets to continue the application of the response in future.	If the response has been consistently applied, calibrated to the pressure, with plans to continue until the pressure has been reduced to a desired level.	The keyword is left blank if there is only one observation, or if there is no observed trend over time in the indicator value.

Table 1.4: Rating Criteria Utilized to Evaluate Performance under Selected Priority Concerns

ENVIRONMENTAL PERFORMANCE			
For purposes of communicating the EPA results, rating of performance under each priority concern is required. In this EPA, a star-rating system is used where any performance counts but with different levels of merit. The star-rating is based on what the indicators are saying, backed up by hard evidence presented in facts sheets, not on what a consensus view or expectations may be.			
1-Star *	**2-Stars ****	**3-Stars *****	**Un-Rated**
(1) If the pressure continues to increase, the state continues to deteriorate and the response(s) do not appear to have any effect on the pressure or the state. Additional criteria for 1-Star rating: 1) Reasonable targets have not been set or have not been met. 2) International conventions have not been ratified or adhered to. 3) No ongoing monitoring or data collection. 4) No clear institutional role and responsibilities for environmental management of environmental concerns have been assigned or where they have been, no tangible progress has been achieved suggesting an appropriate response and non-achievement of the target.	If there are signs that the responses will or have had an effect on releasing the pressure, even though the state does not yet show signs of improvement. Additional criteria for 2-Star rating: 1) Targets have been set and generally met. 2) International conventions have been or will be ratified and most of the reporting requirements have been met 3) Plans exist for ongoing monitoring and data collection. 4) Institutional responsibilities assigned though limited progress achieved due to weaknesses in institutional arrangements e.g. lack of coordination, duplication of roles, multiplicity of authorities etc.	If there is clear evidence that the responses have reduced the pressure and/or there is a clear sign that the state is improving. Additional criteria for 3-star rating: 1) Effective targets have been set and met. 2) International conventions have been ratified and reporting requirements have been met. 3) Ongoing monitoring and databases exist. 4) Specific institutions with targeted roles and responsibilities assigned. Institutional measures in place for the management of the concern e.g. EIA process, adequate budgetary and resources for environment monitoring, staff with appropriate technical skills and know-how, regular interaction with industry and NGOs on environmental management matters etc.	If the trend in the state indicator cannot be explained by the pressures or the responses. The label “un-rated” is a sign that we have failed to identify appropriate indicators backed by facts sheets, and/or have failed to apply the PSR model, and/or have failed to apply the PSR model to performance assessment.

II. MANAGEMENT OF PRINCIPAL ENVIRONMENTAL CONCERNS

1. Forest Resources

1.1 The Context

23. Lao PDR is a mountainous country. Four fifths of the total land area of 236,800 square kilometers is constituted by uplands and highlands mainly in the northern and north eastern parts of the country. In 2000, forestry accounted for about 6 percent of the GDP. Forestry creates jobs, provides employment and generates income for the majority of the population in the Lao society. The annual rate of deforestation averaged about 0.3 percent of the total country land area in the late 1990s (MAF, 1999). The causes are multiple and range from shifting cultivation and inappropriate farming practices in the uplands to poor management of industrial harvesting, illegal logging and pressure to open more land for farming.

24. The principal components of Lao PDR's forest policy are the protection of existing forests (NBSAP, 2003), rehabilitation and reforestation to increase forest cover, and gradual reduction in the use of timber and non-timber forest products. The Government strongly promotes the complete cycle of forestry activities including downstream processing to add value to wood-based exports. Local and foreign investors are encouraged to invest in plantations and timber processing facilities.

25. For the purposes of satellite image analysis, forests are classified into:

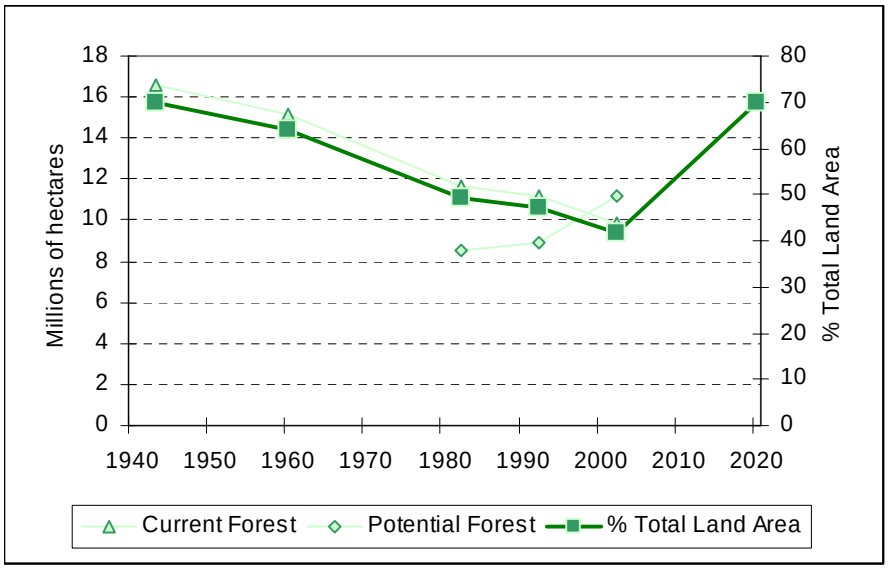
- *Current Forest:* land with crown density (tree canopy cover) of more than 20 percent
- *Potential Forest:* former forest areas with crown density of less than 20 percent. The potential forest includes bamboo areas, unstocked forest, and areas of shifting cultivation. Unstocked area is mainly the fallow after shifting cultivation or areas disturbed by logging.
- *Other Wooded Areas:* refer to areas with trees where the site conditions are so poor that the crown cover can never be expected to exceed 20 percent. This includes Stunted and Shrub Forest.

1.2 State

The Indicator: Forest Cover as Percent of Total Land Area – 1943 to 2003

26. Forest cover, expressed as a percentage of total land area, was selected as the state indicator for forest resources. It is a commonly utilized indicator, promoted by the UN to monitor Millennium Development Goals and this same indicator was selected by other GMS countries for the same purpose. The main advantage of this indicator is that historical statistics are normally readily available. The main weakness is that the indicator does not normally give an indication of the quality of the remaining forest. For Lao PDR, this weakness is partially overcome by the use "current" forest area instead of total forest area.

Figure 2.1.1: Forest Cover as Percent of Total Land Area - 1943 to 2002



27. The forest cover, as defined earlier, is estimated to have declined from 70 percent in 1943 to about 41.5 percent in 2002 (see Figure 2.1.1). At this rate, the forest cover would be approaching 30 percent by year 2020. The rate of decline was relatively stable over the 60-year period although the statement is based on speculative figures for the 1940s and 1960s and very patchy data for the 1970s. Nevertheless there is nothing in the most recent figures to suggest that the rate of decline has been reversed. Furthermore the definition of "current forest" with its 20% canopy (and up) is a soft one presenting a more favorable picture than might be appropriate.

28. The percentage of "potential" forest, the definition of which did not exist before 1982, rises as "current" forest declines and the two areas combined account for 85 to 90 percent of the total land area in any given year. In the last decade of the inventory period the amount of potential forest exceeded the amount of current forest.

29. Potential forest rose from 37.8 percent of total land area in 1992 to 47.1 percent of total land area in 2002. And within this category, un-stocked forest, or former forest with few or no trees, dominates.

30. The Government forestry strategy sets the target of a minimum forest cover of 70 per cent by the year 2020 (World Bank/SIDA/Ministry of Foreign Affairs, Government of Finland, 2001. Lao PDR Production Forestry Policy). This is a very ambitious target that proposes not only to reverse the current trends but to bring the forest cover where it was in the mid 1970's, all within an 18-year period. In order to achieve it, up to 6 million ha are to be naturally regenerated and trees planted on up to 500,000 ha in un-stocked forest area.

Suggested rating: Relatively good but deteriorating

Justification: Seventy percent of Lao PDR was under forest sixty years ago. That percentage has been declining since then and now stands at about 40%. The quality of the forest cover has been declining also with the share of "current" forest" now at only about 40% of the total land area, at the expense of low density forest. The "current forest" itself contains large area of low-density forest.

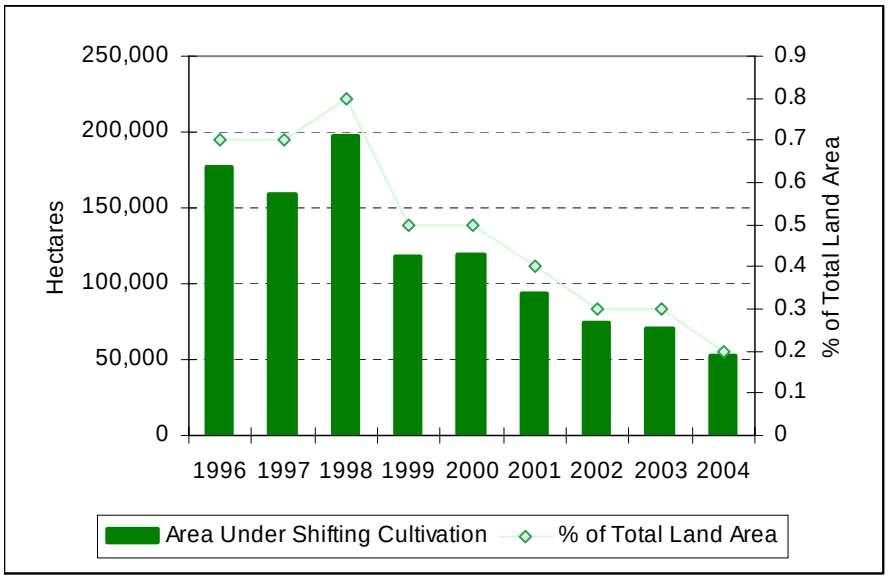
1.3 Pressure

The Indicator: Area under Shifting Cultivation – 1996 to 2004

31. The area of shifting cultivation was selected as a pressure indicator. It is expressed as annual area under shifting cultivation, in hectares and also as a percentage of total land area. Shifting agriculture is widely agreed to exert a significant pressure on the forest resources of Lao PDR. The indicator has the disadvantage of being transitory in nature as area of shifting cultivation gets reclassified, over time, into forestry or agricultural land. Its relevance to the pressure on existing forest is not in doubt, however.

32. The forests of Lao PDR have always been under pressure by people seeking more farmland or having no other survival alternatives than shifting cultivation. Figure 2.1.2 tracks the value of the indicator for the period 1996 and 2004. As can be observed the annual area under shifting cultivation declined from approximately 0.9% of the total land area in 1996 to approximately 0.2% of the total land area in 2004. The decline has been sharp since 1998.

Figure 2.1.2. Area under Shifting Cultivation - 1996 to 2004



33. Shifting cultivation has been the dominant farming system in the uplands for many generations. However, over time, the average fallow periods declined from an average of 4 to 5 years to 2 to 3 years as a result of population pressure, government restrictions on forest clearing, competing land use objectives, and concentration of people near roads and rivers.

34. The values of the indicator point to a substantial decrease in the extent of shifting cultivation areas during the period 1996-2004. The government's recent efforts and investments in road-

and irrigation infrastructure to induce farmers to change from shifting cultivation to more sedentary production systems seem to be paying off although the consequences of road building for the state of forest could be less favorable.

Suggested rating: High but decreasing

Justification: Shifting agriculture has traditionally been an important component of land use and livelihoods in the northern and northeastern parts of Lao PDR. This pressure exerted by shifting cultivation on forests has significantly declined since 1998.

1.4 Response

35. Forest protection has long featured in Lao PDR's policy. The Forest Law defines in more detail the status of protected areas (articles 18, 41 to 47). This Law also commits the Government to the principle of participatory management of protected areas.

36. Article 18 of the Forest Law defines Conservation Forest as forest and forest land set aside for the purposes of conservation of fauna and flora, for scientific study and research and as objects of historical, cultural, tourism and environmental value. Conservation Forest complements other Protected Areas. Conservation Forests can be established at a village, district, provincial or national levels. The Law provides for three zones within conservation forest, i.e. "absolutely prohibited zone", "management zone", and "linking zone".

37. Absolutely Prohibited Zones are areas where no extractive use is allowed, and entry is by permission only. This corresponds to what is elsewhere called "Totally Protected Zone" (TPZ).

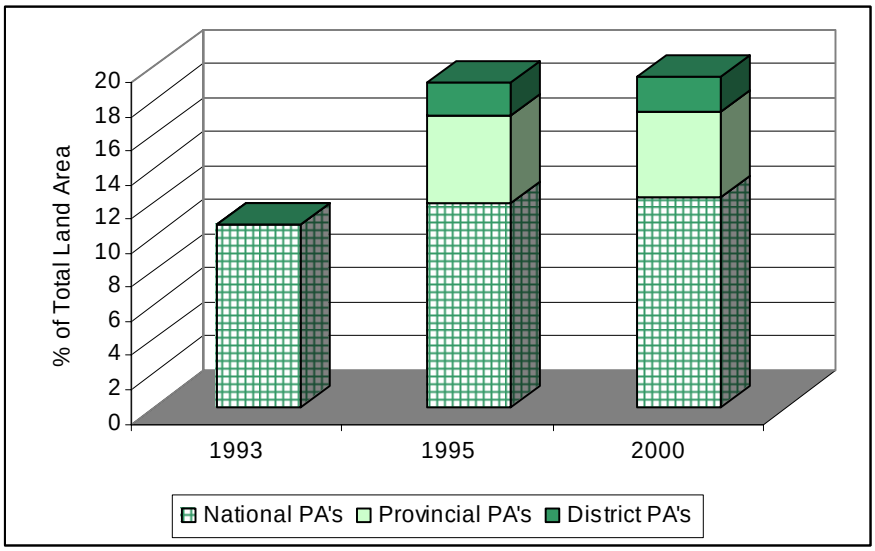
- Management Zones is defined as areas contiguous with TPZs, where limited and regulated extractive use is allowed by "the people". This corresponds to the more common term "Controlled Use Zone" (CUZ)
- Linking Zones connect protected areas to one another or to other types of forest, for the enhancement of wildlife conservation. No hunting, tree cutting or other damaging activities are allowed. They correspond to the concept of "corridors".

The Indicator: Protected Forest as Percent of Total Land Area – 1993 to 2002

38. The area of forest under the system of protected areas was selected as the response indicator for forest resources in Lao PDR. For better comparison with the state indicator, the result is expressed as the ratio over total land area. As constructed here, the indicator is based on ground conditions in year 2002, after the system of protected area was established. The indicator could be improved in the future using ground conditions closer to the year of establishment of the protected areas.

39. The Lao system of protected areas will be described later and in more detail as a response indicator for threats to biodiversity. In the meantime, Figures 2.1.3 below shows the results of the indicator at three significant points in time in the history of the system of protected areas.

Figure 2.1.3: Protected Forest Area as Percent of Total Land Area – 1993 to 2000



40. The first delineation of National Protected Areas (NPAs) was completed in 1993. This resulted in the establishment of 18 NPAs with a total land area equivalent to 12.6% of the total land area. However not all protected areas are necessarily forested and evidenced in Figure 2.1.3 the forest area under this initial allocation, under 2002 ground conditions, is equivalent to 10.7% of the total land area, or approximately 22.5% of the forest area that existed in 1992 when it was last monitored.

41. The addition of provincial and district protected areas and conservation forests to the system of national protected areas in mid-1990s and creation of two additional national protected areas increased the overall total of protected areas to 14.3% of total land area by 2000. No other protected areas were designated between year 2000 and 2002. Assuming forest conditions in protected areas did not change significantly between year 2000 and 2002, the forest area under all protected areas in year 2002 corresponds to 19.1% of total land area, or approximately 47% of the 2002 forest area.

42. More detailed information presented in the factsheet looks at the extent of forest in each protected areas using GIS analysis of 2002 ground conditions. On average, protected areas had 86% forest cover. The least forested was Phou Pha Nang NPA (60%); the most forested was Dong Phou Vieng NPA (98%). If the overall area of protected areas is to remain constant over the next decade or so, the 86% forest cover within protected areas in 2002 could become the baseline for monitoring forest cover within protected areas in Lao PDR since the indicator value is expressed in terms of unchanging total land area.

43. The overall average of 86% is probably comparable to the forest cover of protected areas of other GMS countries. Some GMS countries, including Thailand and Myanmar, have formulated targets for forest cover within protected areas. This has not been the case in Lao PDR where no such official target exists and the focus instead is on increasing the forest cover outside the existing system of protected areas.

44. In the absence of target figures or any other benchmark, it is concluded that the government response to the protection of forest resources in non-comparable but consistently applied. This is based not only on the observed trend of the indicator; it also reflects the steady progress in developing laws and management plans to ensure sustainable development of protected areas.

Suggested rating: Non-comparable and consistent

Justification: Following preparatory activities in late 1980s, the 1990s saw a rapid creation of the protected area system in Lao PDR. Not all protected areas, however, are completely forested. Some have a low percentage of forest cover. The percentage of forest given official protection was therefore lower than suggested by the simple percentage growth of protected areas. The effectiveness of the protection remains uncertain.

1.5 Conclusions

45. By the end of the last decade, large areas of natural forests in the Lao PDR had been opened up. The total area of forest did not change much but its composition did, and dramatically so. The total area of "potential forest", poorly stocked, now exceeds that of "current" forest, i.e. a largely undisturbed forest.

46. Historically, shifting cultivation has been the main driver of this change and shifting cultivation continued to exert major influence throughout the studied period. Inappropriate farming practices in the uplands (shifting cultivation or otherwise) and exploitative timber harvesting further contributed to the observed changes in the extent and quality of the forest cover.

47. Building on the policy of forest land allocation the Government has had some success in reducing the number of households practicing shifting cultivation. More forest was placed under the protected status. However, without additional budgets and strengthening of the capacity of local staff the change of the status alone is unlikely to result in the hoped-for degree of protection.

Suggested rating: One-Star

Justification: In the course of the past three decades, much of existing accessible forest in Laos was significantly degraded. The annual rate of deforestation averaged about 0.3% of the total country land area (MAF, 1999). Shifting cultivation and inappropriate farming practices in the uplands, exploitative timber harvesting, and absence of a well developed forest management planning system were among the contributing factors. The government policy of land allocation to upland households has helped reduce the pressure on the forest resource especially during the last five years or so.

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2. Water Resources

2.1 The context

48. Water resources are one of Lao PDR's principal assets with a potential to support socio-economic development, especially the hydropower and irrigation sub-sectors. Efficient use of water resources is a critical factor in realizing the government's dual strategic objectives of poverty reduction and sustainable economic growth.

49. This has been recognized by the Government and reflected in its legislative and other measures aiming to encourage efficient management of water resources. Effective supply of water to target uses (be they agriculture, hydroelectricity generation or provision of water for household needs) is an essential element in any assessment of water resource management. By itself, water is valuable. Its value increases further when it can be efficiently supplied to the users and allocated to the highest value uses.

50. Lao PDR's mountainous terrain is ideal for hydropower development, with total potential estimated at 18,000 MW on tributaries of the Mekong River, only 682.5 MW of which have been developed to date.

51. Agriculture was the largest user of freshwater accounting for 82 per cent of total freshwater withdrawals in 2000, against 10 per cent for the industry and 8 per cent of domestic use.

52. By 2020 the Government aims to achieve 90% access to improved water supply, in both rural and urban areas, and 80% use of hygienic latrines. Before reaching this stage, efforts will be required to achieve the periodic targets set:

2005: 66% access to water supply and 47% latrines

2010: 75% access to water supply and 60% latrines

2015: 85% access to water supply and 70% latrines

2.2 State

53. Lao PDR is favored by abundant water resources. It is estimated that 35 percent of all water in the Mekong River originates from watersheds within Lao PDR.

Table 2.2.1: Pattern of Water Distribution in the Mekong Basin

	Country or Province						
	Yunnan Province, PRC	**Myanmar**	**Lao PDR**	**Thailand**	**Cambodia**	**Vietnam**	**Mekong River basin**
Catchment area as % of MRB	22	3	25	23	19	8	100
Average flow (m3/sec) from area	2,410	300	5,270	2,560	2,860	1,660	15,060
Average flow as % of total	16	2	35	18	18	11	100
Source: MRC, 2003. State of the Basin Report							

54. About 80 percent of the water flows materializes during the rainy season and the rest during the dry season. Despite the underlying abundance, unusual rainfall patterns in some years, high evaporation, floods, and droughts affecting some agricultural areas of the country are among the problems together with the indirect impact of shifting cultivation on water availability. One of the challenges to Lao PDR is to expand the irrigation capacity (including water storage, and distribution infrastructure) to overcome localized temporary water shortages in a country so richly endowed with water resources. The official target formulated in 2000 speaks of 295,535 ha to be irrigated (MAF, 2001. Agricultural Development Plan). For the time being, there are insufficient data to construct an indicator capturing the adequacy of water supply for Lao agriculture. Instead, in this EPA, more attention is paid to supply of water to households.

55. A high proportion of the population throughout the country suffers from diseases related to deficiencies in water supply and sanitation (MDG, 2004). The National Socio-Economic Development Plan 1998-99 set the target of 60-70 percent of the rural population having access to clean water by the end of the planning period. For the sake of perspective, the population served with improved water supply in all developing countries increased by 8% between 1990 and 2002 to a total of 1,044 million more people (586 million in urban areas and 459 million in rural settings). In South-East Asia, no progress was made in terms of urban coverage due to rapid increases of population (+ 82 million), whereas in rural areas, the percentage of population served improved by some 5%. (+ 13 million). (WHO/UNICEF).

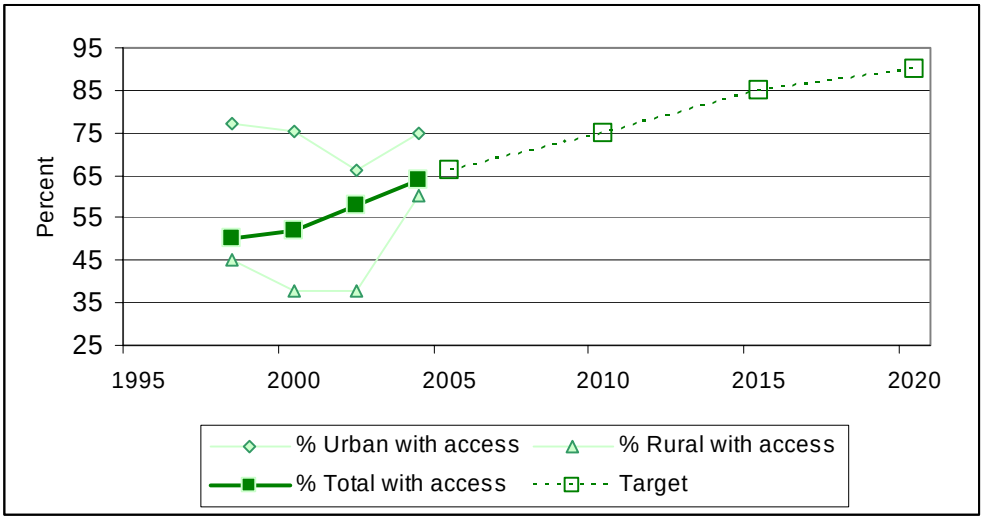
The Indicator: Percent of Population with Access to Safe Potable Water – 1998 to 2004

56. As in most developing countries, access to safe potable water supply is much higher in Lao PDR's capital and main towns than in the countryside. The 2004 census reported the total population of the country to have reached 5.8 million growing at a rate of 2.6 percent per annum (National Statistical Centre, 2004). About 79 per cent lived in rural areas, while 21 percent lived in or around urban centers. However, urban population has been growing faster than rural population that peaked in 2002 at 5.5 million and since began to modestly decline.

57. The UN Millennium Development Goal related to this indicator is stated as "Halve, by 2015, the proportion of people without sustainable access to safe drinking water and sanitation."

Stated differently using the baseline figure of 28% for year 1990, this would translate to a target 74% of the total population. The Lao government however, through The National Strategy for the Rural Water Supply and Environmental Health Sector, has a more ambitious goal which aims to achieve by 66% in 2005, 75% in 2010, 85% in 2015 and 90% in 2020 for access to improved water supply, in both rural and urban areas.

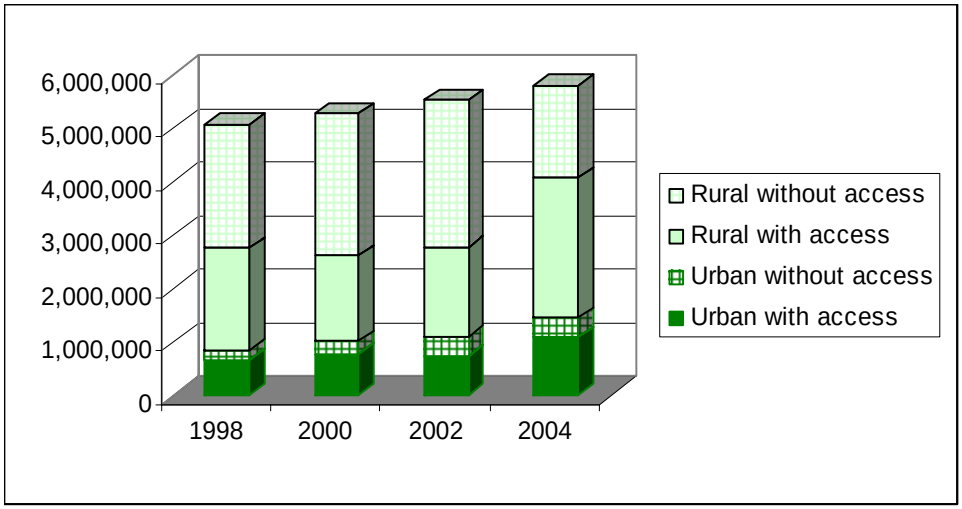
Figure 2.2.1: Percent of Urban and Rural Population with Access to Safe Drinking Water – 1998 to 2004, with Government Targets to 2020



58. As can be observed from Figure 2.2.1, the proportion of the population with access to safe drinking water rose steadily from 50% in 1998 to 63.8% in year 2004. Assuming this success has continued to 2005, there is a good chance that the 2005 target of 66% has been achieved. And at the continued rate of success, there are good indications that 5-year government targets to 2020 can also be achieved. However, it is important to bear in mind that it is more difficult and costly (per unit) to supply drinking water to un-served rural areas than it to supply it to un-served urban areas. Simple projections based on the past rate of success could therefore be unreliable.

59. The problem is also compounded by population movements between rural and urban areas. As can also be observed from Figure 2.2.1, while there was a net improvement of access by 16 percentage points in rural areas during the 6-year period, there was also a net loss of 2% in urban areas during the same period. This does not necessarily imply a deterioration of urban water supplies, nor does it necessarily imply an improvement of the water supply in rural areas.

Figure 2.2.2: **Urban, Rural and Total Population with Access Safe Drinking Water – 1998 to 2004**



60. Figure 2.2.2 presents the same data in terms of the absolute number of people with and without access to safe drinking water. While there was a net loss of access of only 2% in urban areas, the number of people with access to drinking water in urban areas almost doubled from 665,930 in 1998 to 1,090,500 in 2002. This is because during the same period the urban population grew fast. The greatest success in urban areas was had between 2002 and 2004 when the number of those with access increased and the number of people without access decreased. This was the reverse of the situation two years earlier.

61. The decline in the absolute number of people with access to drinking water in rural areas between 1998 and 2000 could similarly be attributed either to a deterioration of rural water supplies or return migration from urban to rural areas during this period.

Suggested rating: Average and Improving

Justification: At 63.8% of total population in 2004, Lao PDR is pretty well on a par with the GMS countries' **average** of 65.5% (considering PRC as a whole and not only Yunnan Province). And based of the observed trend in Figure 2.2.1 and ignoring the loss of momentum in the urban population, it is also concluded that the trend in the state of supplying safe drinking water to the Lao population is **improving**.

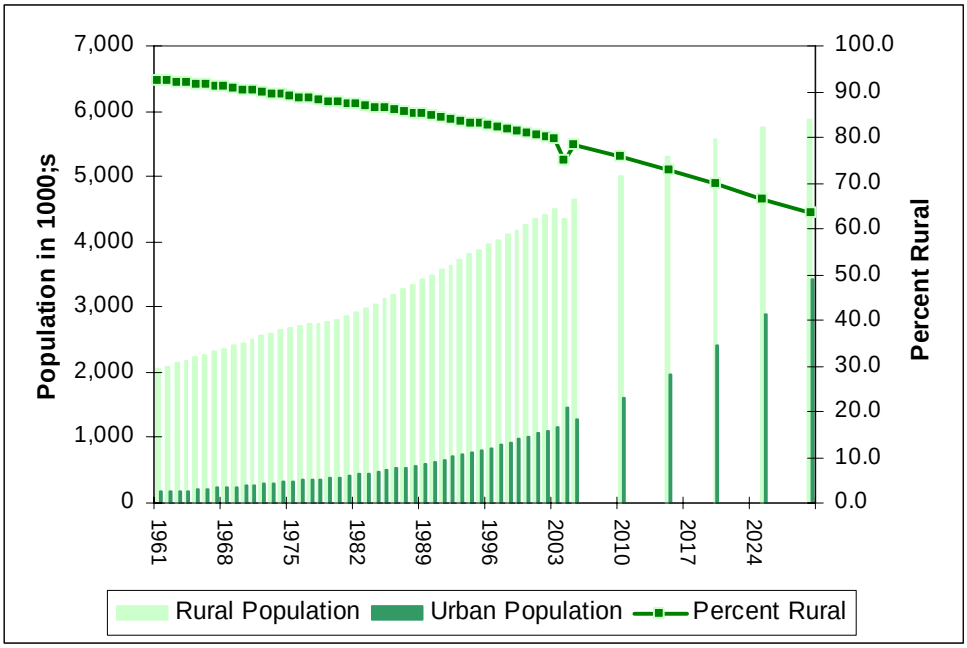
2.3 Pressure

62. Current projections see growing demand for water in the long term although serious competition for water resources is not expected to be a problem in the near future (STEA, 2000a). Water shortages, both of irrigation supplies and drinking water are found in some localities and during certain times of the year, however. The hydropower sector, as a major engine of economic growth in Lao PDR (MIH, 1998), has had and will continue to have priority claim on water resources.

The Indicator: Rural Population – 1961 to 2004

63. As to demand for drinking water, the main driver is the increase in the population to be serviced. Lao PDR's population increased by 2,227 thousand to 5.8 million between 1961 and 2004. Rural population continues to dominate (78% of the total in 2004). However its share in the population total has been declining. The total population is projected to reach 8.8 million in 2020 and while this is bound to add to the demand on water resources, the pressure from the rural segment is unlikely to be decisive.

Figure 2.2.3: Rural Population – 1961 to 2004 and Projections to 2030



64. As can be observed from Figure 2.2.3, the urban population in Lao PDR has increased at a faster rate than rural population, as is the case for most Asian developing countries including those in the GMS sub-region. The result in the case of Lao PDR is that rural population has declined from 92.2% in 1961 to 75% in 2004. Conversely, the urban population has risen from 7.8% in 1961 to 25% in 2004. This has made it somewhat easier to improve nation-wide rate of access to safe drinking water.

65. As can also be observed from Figure 2.2.3, the estimated drop in the rural population between 2002 and 2004 may be a statistical aberration that does not change the long-term tendency of urban population to grow faster than rural population due to migration from rural to urban areas.in

Suggested rating: Medium and Declining

Justification: The GMS-consistent source of population estimates (FAOSTAT-2004) places Lao PDR slightly above the GMS average of 75% in terms of rural population in 2002. And as can be observed in Figure 2.2.3, the pressure from rural populations in on the decline.

2.4 Response

66. The Water and Water Resources Law No. 005 became effective in March 1997. It is the foundation of current water management practices in Lao PDR. The Law adopts the principle of integrated water resources management. The Nam Ngum River Basin was selected as the first river basin in which to pilot the integrated water resources management (IWRM) approach. The objective is to optimize the use of water, land and forest resources in the basin based on the analysis of social, environmental, economic and institutional factors present in the watershed. The project was supported by a total budget of about $94,000.

67. A Water Resources Coordination Committee was established in 1999 to coordinate planning and management activities of line ministries relating to the use and protection of water resources.

68. The Lao National Mekong Committee (LNMC) coordinates with relevant national agencies the formulation of policies and strategic plans and the implementation of development projects on the Lao territory under the Basin Development Plan of the Mekong River Commission, in collaboration with river basin countries, other countries and donors. Additionally, LNMC is tasked with drafting of laws, decrees and other provisions relating to water and water resource development in the Mekong river basin as provided for in the 1995 Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin and the 1999 Decree No. 197 on the Establishment and Operation of the Lao National Mekong Committee.

69. The National Socio-Economic Development Plan 1998-99 was the first to set clear quantified objectives for drinking water provision. The belated achievement of its target was referred to in para 51 above. Until the end of 1990s, water supply development remained concentrated in and around major towns along the Mekong River (FAO, 1999) supported by international aid. As a result, most provincial capitals acquired a piped water supply system, distributing treated river water or spring water to the majority of households. The reliability of the system has been reasonable although water pressure may often have been low and the distribution systems fragile in some locations (STEA, 2000a). In all, 30 municipal centers currently have water supply systems with household connections (WASA, 2002).

The Indicator: Expenditure on improved water supply, 2001-2005

70. Much less attention was initially paid to rural areas. That emphasis changed with the adoption of the water supply sector policy and investment plan for water supply sector in 2000.

Table 2.2.2: Expenditure on Improved Water Supply – 2001 to 2005

	2001	2002	2003	2004	2005	Total
Foreign aid expenditure on urban water supply projects (USD thousand)	4,906.7	11,239.3	10,346.1	1,574.4	-	**26,492.1***
Government budget expenditure on urban water supply (Mill. Kip)	35.0	45.0	49.0	28.8	-	**157.8***
Foreign aid expenditure on rural water supply projects (USD thousand)	25,631.8	58,199.0	71,009.0	54,566.0	61,450.0	**270,855.8**

Government budget on rural water supply (Mill. Kip)	409.0	1,020.0	1,224.0	1,440.0	1,728.0	**5,821.0**
Source: MCTPC/DOU, 2001 Investment planning for the year 2001-2005 and CPI 2004 National Socio-Economic Development Planning 2004-2005						

.*The totals refer to the period 2001-2004

71. As can be observed from Table 2.2.2, water supply in Lao PDR is overwhelmingly financed by foreign donors and if access to safe water has improved in Lao rural area, it has been principally good performance of the donors rather than the Government that deserves credit. Nonetheless, the constructive and responsible attitude of national agencies was an indispensable ingredient that contributed to the overall outcome.

Suggested rating: Average and Intermittent

Justification: Expenditure on improved water supply in the countryside remained low until the very end of the 1990s when additional donor funding made it possible to expand access to safe water in the countryside. The "intermittent" rating reflects this uneven flow of expenditure.

2.4 Conclusions

72. Access to safe water supply enhances living conditions of the people, particularly their health. In Lao PDR access to safe water supply improved substantially during the last decade. This is cause for satisfaction. However, the data at the provincial level describing the quality of surface and groundwater are limited. No summary information could also be found concerning the functioning of the water supply systems in smaller urban settlements that received assistance in the past for basic piped water systems with public stand posts, shallow wells or boreholes. The fact that so little information exists about the actual functioning of the facilities financed during the last decade should invite caution in accepting uncritically the figures of overall achievements in water supply provision.

73. The management of water resources was assessed here by reference to the access to drinking water. This may be appropriate at this stage with drinking water provision a major social and environmental challenge. Nonetheless future EPAs will do well to consider also the adequacy of irrigation supplies and sustainability of water resources management.

Suggested rating : Two-stars

Justification: After years of stagnating performance, there was a significant increase in the percentage of rural population with access to safe potable water between 2002 and 2004. At the same time, access in urban areas, traditionally much better than that in rural areas, stagnated or even deteriorated. Rapid increase of urban population seems to have been the main cause. Put differently, the population dynamics (rural-urban migration) alone explains a part of the observed changes in the percentage of rural and urban household having access to potable water.

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3. Fish Resources

3.1 The Context

74. Fish and fisheries play an important role in the country's development as most rural people in Laos rely on fish as the main sources of protein. Fishing takes place in the Mekong River and its 14 tributaries, as well as in large reservoirs. In addition, shallow irrigation areas, rice paddies and cage culture are an important additional source of fisheries output (see Table 2.3.1 below).

75. In Lao PDR, as in other GMS countries, river or lake fishing has coexisted with an expansion of aquaculture and any fall in the output of the former segment has been partly compensated for by increased aquaculture production as shown further below despite various constraints such as lack of "seed", supplemental feed and weak extension service. Fishponds are the most common form of aquaculture practiced in the country. Traditional aquaculture practiced by farmers depend mostly on the wild species of fish entering into the ponds. In general aquaculture production in Lao PDR is characterized by a rather low output per area. This calls for improvements in production technologies as well as improved quality of fish seed.

76. Rice-fish farming has been practiced in the Mekong basin for hundreds of years. Farmers in northern, central and southern provinces with rice fields with embankments culture locally available species. In the central and southern warmer regions, the common practice is to construct a small pond and/or trench around the rice field. Over 92% of the households who own ponds practice some sort of aquaculture and 8% of the households (especially in the Northern provinces) integrate aquaculture with rice farming (Agriculture Census 2000). According to the information provided by the DLF, the pond culture area has increased from 6,000 ha in 1990 to 16,875 ha in 1999 and the integrated rice-fish farming area from 4,000 ha to 16,200 ha during the same period.

Table 2.3.1: Capture Fishery and Aquaculture in Lao PDR

	Water Resources	Total Area (hectares)	Productivity (kg/ha/yr)	Estimated Production (tons/yr)	% of Total Production
Capture Fisheries	Mekong River and 14 tributaries	254,150	70	17,790	25.0%
	Reservoirs	57,025	60	3,421	4.0%
	Irrigation and small reservoirs	34,460	150	5,169	7.4%
	Swamps and wetlands	95,686	30	2,870	4.0%
Ponds, pools and Aquaculture	Fish Ponds	10,300	1,000	10,300	15.0%
	Rice-and-fish	3,050	150	475	0.6%
	Rain-fed rice and irrigated rice fields	477,176	50	23,850	34.0%
	Small natural pools, oxbow and irrigation weirs	12,934	573	7,441	10.0%
Total		944,781		71,316	100.0%
Source: NBSAP 2004					

3.2 State

77. Aquatic resources are a very important source of animal protein and food security for Lao people, especially in the countryside. A fisheries survey in Luang Prabang Province carried out in 2005 by the Living Aquatic Resources Research Center (LARReC) in cooperation with the MRC Fisheries Program, Assessment of Mekong Fisheries Component (AMFC) concluded that the average yearly per capita consumption of all fish and aquatic products is 29 kg per person per year, with fresh fish accounting from 16 and 22 kg.

The Indicator: Retail Price of Fish at Constant Prices – 1995 to 2004

78. The trend of prices of fish, adjusted for underlying price inflation and allowance made for seasonal variations, can be a useful indicator of the state of the resource, in particular the emergence of scarcity. This is so despite well known drawbacks of price-based proxies in judging the underlying abundance of the resource: First, prices depend on factors such as incomes and the pattern of demand s as well as the supply. Second, a price decline in the short run may be a sign of overexploitation rather than abundance. Yet, observed over a long enough period, prices do convey useful information.

Table 2.3.2: Retail prices of commonly consumed fish in Lao PDR – 1995 to 2003 (Kip/kg at prices of 1995)

Exotic species	1999	2000	2001	2002	2003
Tilapia 1995=100	1,763	1,388	1,286	995	668
Indigenous species	3861	2,776	2,573	1,990	1,336
Source: Living Aquatic Resources Research Center (LARReC)					

79. Retail prices of indigenous species such as catfish have traditionally been significantly higher than those of cultured species such as Tilapia, Common carp, Indian major carp and Chinese carp. The 2004 prices for the former group were between 22,000 and 30,000 kip / kg while the latter group were priced at 13,000 to 22,000 kip/ kg. If anything, it seems that the price differential has mover further in favor of indigenous species possibly indicating their growing scarcity. Unfortunately the time series of prices is not sufficiently long to make such generalizations with greater confidence. Table 2.3.2 shows the data at constant prices of 1995. Important to notice is the declining real prices of both categories of fish, suggesting that –unless a significant shift in the pattern of food demand has occurred-- fish are getting more, not less, abundant.

Suggested rating : Relatively good and stabilizing
Justification: The real price of fish, i.e. after the effect of general price inflation is accounted for, has shown a steady or declining trend. The differential between the prices of indigenous and cultured species continues to be in favor of the price of the former group, possibly indicating emergence of scarcity of certain species in the Mekong and its tributaries.

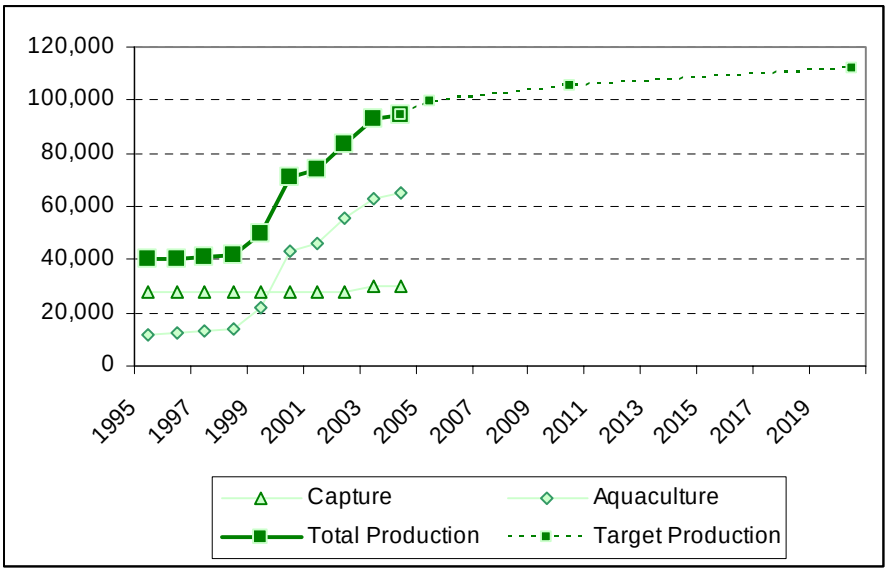
3.3 Pressure

80. The output of capture fisheries stagnated during the last decade despite the growth of population. The causes may be several and could include modification in the hydrology of river and inappropriate fishing. It is also possible that the official figures of the total capture catch underestimate true magnitudes as suggested by studies undertaken in recent years by the Mekong River Commission and FAO that –based on per capita fish consumption surveys—put the annual output of capture fisheries at around 60,000 tons.

The Indicator: Volume of Fisheries Production - 1995 to 2004

81. The official data on fish production in Lao PDR from 1995 to 2004 are summarized in Figure 2.3.1 below. It is clear that aquaculture has become the decisive component of the total output and has been able to compensate for the stagnation in the volume of capture fisheries. These findings seem consistent with the movement of inflation-adjusted prices of fish during the same period.

Figure 2.3.1: Volume of Fish Production - 1995 to 2004



Suggested rating : Low and decreasing

Justification: Official figures of fish output suggest that the total fish output during the last decade comfortably outstripped the growth of the population. This trend would have been even more pronounced if the volume of capture fisheries output were revised upwards as suggested by FAO and MRC. In the absence of more detailed data and studies it is impossible to say whether current trend of capture fisheries output is sustainable or not.

3.4 Response

82. Fisheries activities in Laos are in part regulated by existing water resource management legislation, in particular Decree 118/CCM (1989) on the Management of Wildlife, Hunting and Fishing, the Law on Water and Water Resources (1996), and the Environment Protection Law (1999). The Ministry of Agriculture and Forestry is developing fish conservation zoning.

83. Recently the government of Lao PDR has taken steps to decentralize natural resource management including the management of fisheries. The main components of the Government's policy are to (1) bring management actions closer to the fishermen or stakeholders; (2) address the question of open access to fish resources; and (3) improve the efficiency of government fishery agencies. In the area of aquaculture there are 14 government fish seed stations and a number of private hatcheries that have sprung up in recent years in peri-urban areas. The statistics provided by DLF indicate that during 1998, government hatcheries produced 14.2 million fry/fingerlings that were supplemented by 24.5 million fry/fingerlings by the private sector, bringing the total fry/fingerling production to 38.7 million.

84. Until 2000, there was no systematic fisheries extension system and limited capacity of provincial and district level authorities to disseminate the technologies to the rural poor The Regional Development Committee (RDP) for Southern Laos was established in 1997 as an alliance of national and international institutions that brings together resources and expertise and is assisting provincial and district staff in developing farmer networks for spawning and nursing fish.

The Indicator: Expenditure on Fish Management – 1991 to 2000

85. Since 1995 a number of externally funded donor projects have provided assistance to develop aquaculture in Lao PDR. These projects included the construction of hatcheries, nurseries and fish farms, technical assistance to the Department of Livestock and Fisheries on policy development and sector management and support to the development of aquaculture extension service in the country. Table 2.3.3 is a summary of financial support to natural resources sectors as they feature in the Public Investment Program.

Table 2.3.3: Biodiversity in Public Investment Programs 1991-1995 and 1996-2000 – Million USD

Year	Forestry	Crops, livestock & fisheries	Non-biodiversity	Total PIP
1991	10.2	34.6	89.3	134.1
1992	12.7	29.1	213.3	255.1
1993	9.6	22.1	190.6	222.2
1994	5.4	15.3	262.1	282.8
1995	3.3	8.4	226.3	237.9
1996	9.0	16.3	187.5	212.8
1997	10.7	20.5	249.0	280.2
1998	10.2	26.7	291.8	328.6
1999	12.2	29.4	329.1	370.7
2000	12.4	35.1	296.4	344.0
Source: Living Aquatic Resources Research Center LARReC and World Bank 1997				

86. A three year rolling Public Investment Programs (PIP) are the main mechanism by which the government secures donor funding for its investment activities. It is estimated that over three-quarters of PIP outlays are financed from foreign sources (World Bank 1997). [1] For the two PIPs (1991-1995 and 1996-2000), investments in all natural resource management categories combined averaged $ 33.0 million a year, or 12.5% of the total PIP. No disaggregated data are available that give a more detailed picture of investment by individual natural resource sub-components of the PIP.

87. A co-management program related to Fish Conservation Zones (FCZ) was set up in 59 villages between 1993 and 1997 (Baird et al, 1998). These Fish Conservation Zones were largely associated with deep pools within the Mekong mainstream which are considered important as a refuge for fish in the dry season. The effectiveness of the FCZ is currently being evaluated under the auspices of the Living Aquatic Resources Research Center (LARReC).

Suggested rating: Average and consistent
Justification: Overall financial support for fisheries management has been maintained throughout the last decade.

3.5 Conclusions

88. The fisheries production in Lao PDR continued to expand in the recent decade. Despite the growth in population there is no evidence of increasing scarcity of fish in Lao PDR, overall. However the role of capture fisheries is being eclipsed by aquaculture and the stagnation in capture fisheries output in recent years could be an indicator of looming scarcity of fish in the Lao portion of the Mekong and its tributaries. However, major doubts exist about the reliability of official figures of capture fisheries. The donors' and Government's support to the fisheries sector, especially aquaculture, had a significant and positive effect on the overall results.

Suggested rating: Two-stars
Justification: The country with its vast water resources is in early stages of aquaculture development that has already contributed significantly towards food security and income generation, especially in the rural areas where 85% of the population live.

References

- *Coates, D.2002. Inland Capture Fishery Statistics of Southeast Asia: Current Status and Information Needs. RAP Publication No. 2002/11, Asia-Pacific Fishery Commission, Food and Agriculture Organization of the United Nations, Bangkok.*

[1] The PIP however includes only investment projects that have some -no matter how small- co-financing from the state budget. Therefore it excludes wholly donor-funded activities involving crops, livestock, fisheries, forests and biodiversity.

- *CPI, 2004. National Socio Economic Development Plan. Lao Expenditure and Consumption Survey1997/98 and 2002/03. LECS 2 & 3*
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4. Threat to Biodiversity

4.1 The context

89. Lao PDR is predominantly mountainous, and this creates wide variations in climate, soils, and ecological niches, leading to locally adapted and diverse biota. High endemism in Lao PDR is partly a consequence of its geography and location as a small landlocked country bordered by mid-sized mountains to the North and East, and by the Mekong river delta to the South and West.

90. WWF has identified 200 eco-regions worldwide and four of them are located in Lao PDR. These include (see below) the Annamite Range Moist Forests, Indochina Dry Forests, Northern Indochina Sub-tropical Moist Forests and the Mekong River and its tributaries. Described in a little more detail, the Laos' principal habitats are:

- *Evergreen Forests of the Annamite Mountains and foothills.* This is considered the most biologically distinct ecosystem with the "Forest of the Lower Mekong Ecoregions Complex" (FLMEC). Annamite forests are found only in Laos, Vietnam, and Cambodia, but they are probably of highest quality in Laos, due in part to lower human pressure.
- *Central Indochina Limestone Karst***.** Like the Annamites, species endemism is high and the habitat is found elsewhere only in Vietnam. It is represented in Laos in Phou Hin Poun (PHP) and Hin Nam No (HNN) NPAs.
- *Dry Dipterocarp***.** Forests of the Mekong Plain. Found mainly in southern Laos, and characterized by relatively flat, low elevation land with grass and herbs under widely spaced deciduous trees (predominantly Dipterocarpaceae). It is typically studded by permanent or seasonal pools, which are of high importance for a variety of wildlife, from large ungulates to rare waterbirds. This habitat is best represented in Xe Pian (XPN) NPA.
- *Bolovens Plateau***.** This massif between the Mekong and the Annamites in southern Laos is a habitat of high distinctiveness in the FLMEC. It occurs only in Laos, and part of it is protected in only one gazetted NPA, Dong Houa Sao (DHS).
- *Northern Highlands.* The mountains of the north are biogeographically distinct from the Annamites in the central and southern part of the country, with different species assemblages. Representations occur in northern NPAs such as Nam Ha (NHA), Phou Dene Din (PDD), Nam Et (NET) and Phou Loey (PLY).
- *Mekong River.* The Mekong River is the main river in Lao PDR. Demarcating the border with Thailand, the river flows in Lao PDR for about 1,898 km, most of which is navigable (SoE, 2001). Laos has a pivotal role in the conservation of the biodiversity of the Mekong. Not only does much of the river run through Laos and along its border, more of the drainage that feeds the river is found in Laos than any other country.
- *Other rivers and streams***.** The Mekong River Tributaries in Lao PDR carry about 35% of the total volume of water flows into the Mekong River. Tributaries of the Mekong River within the country are the main source of capture fisheries (SoE, 2001).
- *Wetlands* . These play an extremely important role in the subsistence and commercial economy of Laos, especially in the lowlands. As well as biological values, wetlands also have essential roles in transportation, flood amelioration, hydropower generation, and provision of potable water.

91. Forests are the dominant component in the majority of the habitats listed above. About 80 percent of the country's territory is constituted by uplands and highlands mainly in the northern and north eastern parts of the country. Above 800-900 m elevation, forest structure and species composition undergo rapid changes from lowland forest type to mountain forest (NBSAP, 2004). Lowland forests are those generally below 800-1000 m elevation. In Laos they are divided into six types, i.e. wet evergreen forests, semi evergreen forests, secondary semi evergreen forests, mixed deciduous forests, deciduous dipterocarp forests and woodlands, and lowland pine woodlands.

92. Large areas of Lao PDR have been designated as wildlife and flora sanctuaries and gazetted as Protected Areas (at national-level, provincial and district levels). The country's diverse ecological habitats contain at least 10,000 species of mammals, reptiles, amphibians, birds, freshwater fish, insects, and vascular plants.

93. The importance of biodiversity conservation has long been recognized by Laos' political leadership. Internationally, Lao PDR is a signatory of the UN Convention on Biological Diversity and as part of its obligations under that convention, drafted the National Action Biodiversity Strategy and Action Plan in 2003. Laos has received substantial amounts of donor assistance directed at biodiversity protection.

4.2 State

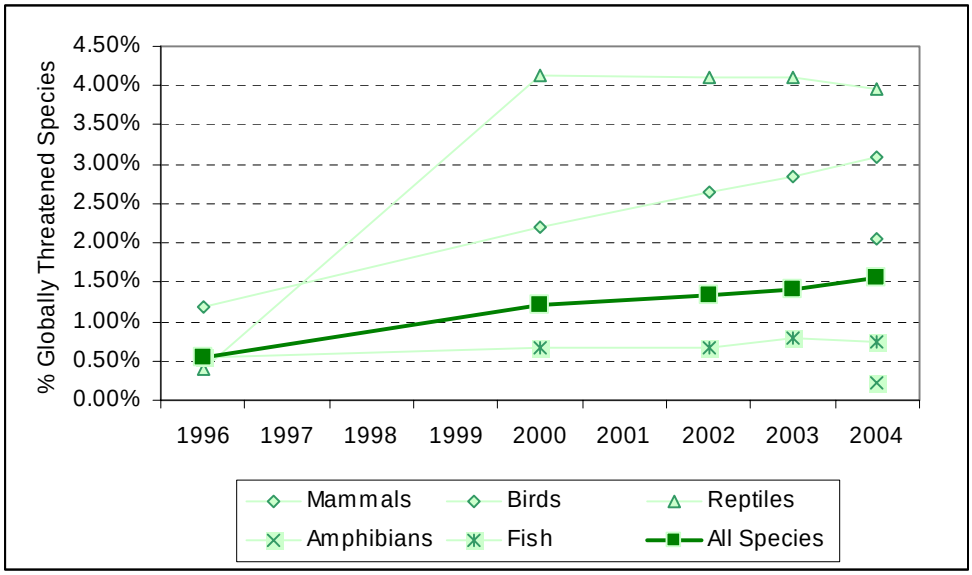
The Indicator: Threatened Species as Percent of Globally Threatened Species – 1996 to 2004

94. The number of nationally threatened species expressed as a percent of globally threatened species was selected as the state indicator and this same indicator has been developed for the other GMS countries. The indicator is based on the latest 2004 IUCN "Red List of Threatened Species" but only for threatened mammals, birds, reptiles, amphibians and fish. Plant species, for which the evaluation work has only just begun in the IUCN Red List, are excluded from the indicator. Threatened species are those which have been classified as "critically endangered", "endangered" or "vulnerable" on the IUCN Red List. Extinct species, least risk species or species with data deficiencies are excluded.

95. It is emphasized here that the IUCN Red List is a relatively new instrument to monitor loss of biodiversity. The Red List was initiated in 1996 without plant species, updated with some plant species in 1998, updated in year 2000 with more consideration for reptile species, skipped in year 2001 and it is only since year 2003 when bird species were added that it shows some degree of completeness and annual updating. The indicator is therefore a baseline indicator for the future monitoring of threatened species and any trend observed in the indicator since 1996 is not indicative of loss of biodiversity but rather on the level of effort that IUCN biologists have placed on certain species groups in certain years. The Red List is never-the-less the best source of consistent information on threatened species and it will no doubt improve over time.

96. Further information on the value and interpretation of this indicator is detailed in the corresponding factsheet. The results of 2004 online interrogation are captured in Figure 2.4.1 below:

Figure 2.4.1: Threatened Species as Percent of Global Threatened Species – 1996 to 2004



97. As can be observed from figure 2.4.1 above, Lao PDR is a tentative sanctuary to approximately 1.6% of the globally threatened species. This standing includes approximately 3.1% of globally threatened mammals, 2.1% of globally threatened birds, 4% globally threatened reptiles, and less than 1% of globally threatened fish or amphibians.

98. The rise in the share of globally threatened species from 0.54% in 1996 to 1.56% in 2004 is not indicative of a loss of biodiversity from 1996 to 2004; it more indicative of to the progress of the evaluation work by IUCN biologists. The 0.54% value in 1996 is based on the first version of the IUCN 1994 Red List at which time only 60% of the relevant mammals had been evaluated, few reptile and fish species had been evaluated and at which time amphibians and birds were not part of the equation. The relevant amphibians and birds were in fact not evaluated until 2003.Therefore the indicator value and trend before 2003 has very little meaning.

99. Now that the indicator value is inclusive of all threatened species types, the future value of the indicator will be more indicative of the trend in the loss of biodiversity in Lao PDR. It is not expected to vary dramatically from the 2004 figures. It may artificially rise if new globally threatened species also have sanctuary in Lao PDR; it may artificially fall if new threatened species have sanctuary outside of Lao PDR. There is already evidence of this artificial fall in the reptile species after year 2000. While the indicator serves well to measure Lao PDR's share of a global priority, only changes in the status of individual species, which are detailed in the factsheet, can be utilized to measure progress at the national level.

100. The IUCN database has provided some insight as to the major threats relevant to the threatened species in Lao PDR. Loss of habitat is the dominant threat for 35% of the threatened species but harvesting is a close second at 24%. Therefore societal responses which deal with

the hunting and gathering of these threatened species may be of equal importance as those societal responses which attempt to protect their habitat.

101. The database has also provided some insight as to what are the habitats of those species relevant to Lao PRD and what are the major threats to those threatened species. Forests were cited as the dominant habitat for approximately 40% of threatened mammals, birds and amphibians but loss of wetlands and grasslands are also identified as important habitat. Loss of shrub lands and artificial/terrestrial habitats, which include arable land and pasture land, may also be critical habitat for some of Lao PDR's threatened bird species. Therefore societal responses which attempt to protect non-forest areas may be of equal importance.

102. As of 2004, 48 species were listed as vulnerable, 21 as endangered and 12 as critically endangered. Any future decrease in the level of endangerment of these species or the removal of the species from this threatened list, is indicative of progress in conserving biodiversity; any future increase in the level of endangerment will be a negative indication of progress.

103. None of Lao PDR's share of the globally threatened species are endemic to Lao PDR and therefore Lao PDR alone is not solely responsible for its 1.6% share of globally threatened species. However for 8 of the threatened species, Lao PDR and one of its GMS neighbors (mainly Vietnam) share the total responsibility. It was also been observed that 28 of Lao PDR's current 81 threatened species are endemic to GMS sub-region.

104. Lao PDR's 1.6% of globally threatened species ranks lowest amongst the six GMS countries. Reptiles species are the largest contribution to Lao PDR's share of the threatened species, as is the case for all other GMS countries or for the GMS sub-region. While half of these reptile species are endemic to the GMS sub-region and sometimes one neighboring country, none are endemic to Lao PDR.

105. The key message from the related indicator factsheet is that, as of 2004, Lao PDR could be providing sanctuary to approximately 1.6% of the globally threatened species. And as with other GMS countries as a whole, reptile species are the largest contributing factor to the overall number of threatened species in Lao PDR. Loss of forest habitat is the most cited threat but loss due to hunting and gathering is also significant as are other habitats such as wetlands and grasslands.

Suggested Rating: Relatively Good and undetermined trend

Justification: The 1.6% result for Lao PDR is second lowest amongst the six GMS countries where the average is approximately 2.1% of the globally threatened species. As baseline indicator, it would be too pre-mature to derive any past trend.

4.3 Pressure

The Indicator: Ratio of Natural Forest to Plantation Forest – 1976 to 2002

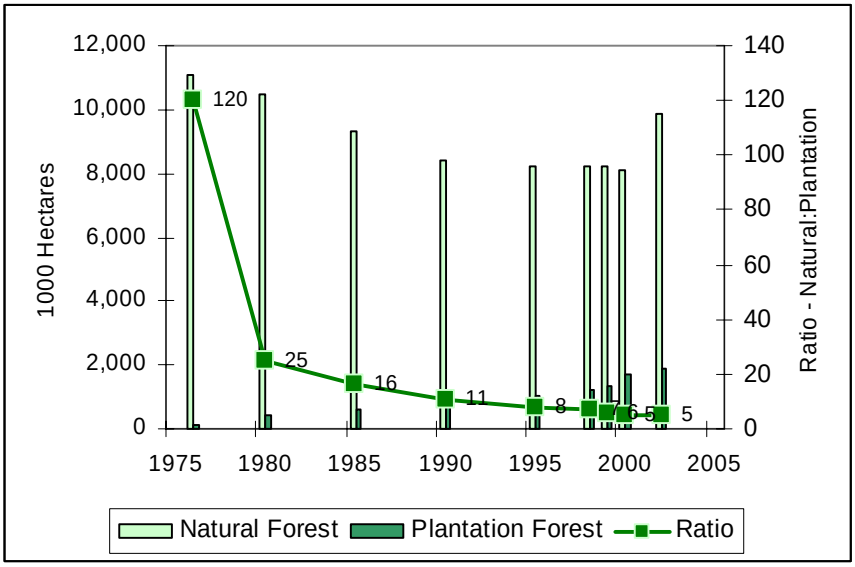
106. As can be observed from Figure 2.4.2, the ratio of natural forest area to plantation forest area declined from 25:1 in 1980 to 5:1 in 2002. In other words, there was 25 times more natural forest than plantation forest in 1980 and in 2002, there was only 5 times more natural forest

than there was plantation forest. During this 22-year period, this is the result of 608,000 hectare decline in natural forest area combined with a 1,492,000 hectare increase in the area of plantation forest.

107. The sharp decline in the value of the indicator may be of concern for the conservation of biodiversity but the current result (5:1) is not an alarming figure. The ratio of the indicator may only be cause for alarm when it exceeds 1, i.e. as the area of plantation forest exceeds the area of plantation forest. A more complex question of the biodiversity conservation potential of different types of plantation forest vs. different types of degraded forest is not dealt with here but a better knowledge of that relationship may improve the quality of future EPAs.

108. Based on the lack on any other comparative values and the lack of a direct target for this pressure indicator, it is concluded that the pressure on biodiversity, as tracked by this indicator, is medium and increasing.

Figure 2.4.2: Ratio of Natural Forest to Plantation Forest – 1976 to 2002



Suggested rating: Medium and increasing
Justification: Eighty percent of Lao PDR remains forested, although more than a half of the total is seriously degraded. The area of natural forest, in varying stages of degradation, has been declining in relation to the areas of plantation forest. The exact extent and quality of plantation forest remains subject to significant uncertainty. Despite that, the overall relationship between natural and plantation forest is one of a comfortable surplus of the former over the latter for the time being.

4.4 Response

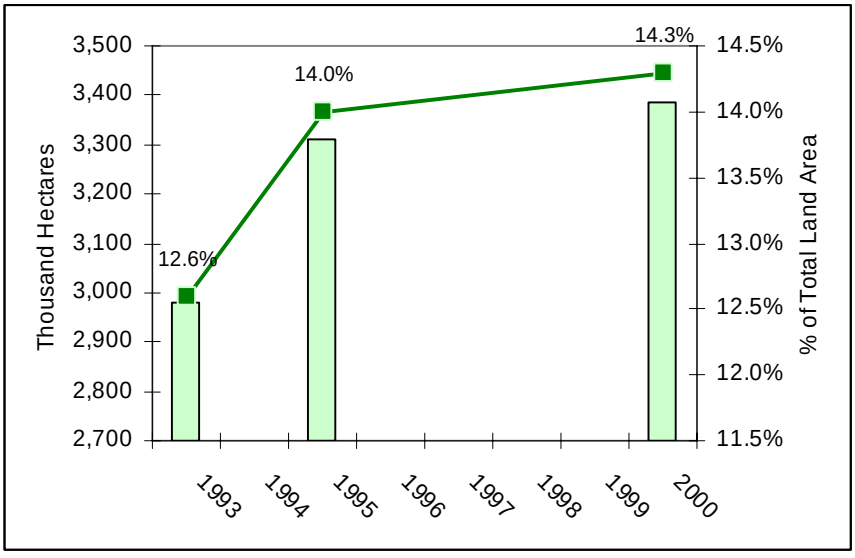
The Indicator: National Protected Areas as Percent of Total Land Area – 1993 to 2002

109. Protected areas within the Lao System of Protected Areas, expressed as a percent of total land area was selected as the response indicator for threats to biodiversity. It is a widely utilized indicator of government response to conserving biodiversity, it is recommended by the secretariat of the UN Convention on Biological Diversity and the same indicator has been utilized by other GMS countries and province. As designed here and for better comparison with other GMS country results, the indicator does not include provincial or district protected areas or conservation forests; however these has been considered in the overall description of protected areas.

110. Unlike some other GMS countries (e.g. Thailand and Myanmar) that have a long history of designating protected areas, but not unlike Cambodia, most of the Lao national protected areas (NPAs) were established in the 1990s. In the case of Lao PDR, the starting point was the Prime Minister's Decree No. 164 of 1993 that drew on extensive donor-funded preparatory activities in the late 1980s. Potential NPAs were first surveyed in 1988. By 1993, 18 areas covering 12.6% of the land area of the country were officially decreed as NPAs (initially called National Biodiversity Conservation Areas or NBCAs). Two more NPAs (Dong Phou Vieng and Xe Sap) were added in 1995-1996, bringing the total of NPAs to 20, PM Decree No. 193 of 2000 established two NPA corridors namely Nakai Nam Theun - Phou Hinpoun, and Nakai Nam Theun - Hin Nam Nor. As of 2002, the system of national protected area amounted to approximately 3.4 million hectares or 14.3% of the country's land area.

111. The progress of expanding the NPA system is summarized in Figure 2.4.3 below which shows that the protected area have not expanded much after 1993. This initial 1993 allocation however corresponded to 12.6% of the total land area and exceeded the recommendation by the IUCN that 10% of the total land area be allocated to biodiversity conservation and protection.

Figure 2.4.3: National Protected Area as Percent of Total Land Area – 1993 to 2002



112. In the mid 1990's the NPAs were supplemented by provincial and district protected areas and conservation forests. Provincial or district projected areas currently account for

another 2.1% of the total land area; conservation forests add another 6.0% of total land area. In all, approximately 5.3 million hectares or 22.6% of the total land area is under some form of protection. While the area at all three levels of jurisdiction is significant, NPAs are currently in the lowest of the IUCN category (Category VI) and are in fact multiple use areas.

113. The Ministerial regulation 0524 describes how national protected areas should be administered, zoned and managed. It provides for and promotes sustainable use of biodiversity in the more than 1,100 villages that are inside and within 5 km of the existing national protected areas (Southammakhot, 2000). The concept of Integrated Conservation and Development Projects (ICDPs) has also gained acceptance in Lao PDR as a practical way of reconciling economic development with conserving biodiversity. Participatory ICDPs have been developed for several protected areas including the Nakai Nam Theun NPA.

Suggested Rating: Average but Intermittent
Justification: The "Average" rating of response is based primarily on the IUCN recommendation that each country allocates 10% of its total land area to biodiversity conservation and protection. The Lao system of national protected areas exceeds this amount by 4.3% percent of the total land area but other GMS countries have exceeded this amount by greater orders of magnitude. A "Low" rating of response was considered based on the fact that Lao NPAs are multiple use areas but the added area offered by provincial and district protected areas and conservation forests do not warrant this rating. On the other hand, lack of a better level of protection for at least the core area of these NPAs does not justify a "Significant" response rating. The rating of the trend of the indicator as "Intermittent" is consistent with the text of the evaluation criteria which suggest that this rating be applied "if the response has not been consistently applied but there are programs and budgets to continue the application of the response at some future point in time". The response cannot be rated as "Consistent" because there is no evidence that that the system of NPAs will be expanded in the near future.

4.5 Conclusions

114. Historically, low population density has contributed to the protection of Laos' rich biodiversity. Despite that cushion of protection, shifting cultivation and uncontrolled logging have substantially reduced or altered the area of forest, the principal biodiversity habitat in the country, during the past thirty years. More than a fifth of the total land area was placed under formal protection during the 1990s through a network of 20 National Protected Areas (NPAs) and conservation forests. The effectiveness of the official protection designation has been blunted by insufficient funding of protection activities in most cases that resulted in these areas being given a relatively low level of protection (IECN Category VI).

115. Loss of biodiversity in Lao PDR and in other GMS countries are national priority concerns but loss of biodiversity is also a global concern and a global problem. The issue is complex because some globally threatened species may be abundant in one particular country; also threatened species do not respect country boundaries. Because of biodiversity's global dimension it is difficult to design a monitoring system and databases at the national level to track biodiversity loss. The IUCN Red List is currently the only reasonable instrument to monitor the gain or loss of biodiversity but it does not yet offer a systematic picture of long-term trends. Only the current and relative state of threatened species in Lao PDR could be determined using this instrument and not much can be deduced regarding past trends. The only thing we know

with some level of confidence from the state indicator is that the state of threatened species is relatively good in Lao PDR to start with.

116. The pressures of biodiversity are also well known but they are many. Loss of forest habitat (mainly for mammals and birds) is well monitored. It is by no means the only contributing factor to the loss of biodiversity. Loss of wetland and grassland habitats (also for mammals and birds) is also threatening biodiversity. Hunting and gathering have and probably still are major contributing factors, as well as human disturbance in areas that are designated protected or multiple-use areas. There is no single indicator which can capture all of these pressures.

117. While there have been a number of government responses to address the concern, it may take decades before the pressures are reduced and the state is improved. For performance assessment, it is not the magnitude of the responses which is the determining factor; it is the anticipated impact of the response (to release the pressure and improve the state) which is under the microscope. The Government has done well to declare a substantial proportion of the land area as protected areas but it is the management of those multiple use areas that will determine the fate of the biodiversity which lies therein. The GoL has also done well to ratify international conventions but those conventions alone do not restore the state of existing biodiversity. In assessing the performance to date, it is equally important to consider the responses that have not yet been made to address the concern, as well as those which have been adopted.

Suggested rating: One-Star

Justification: The quality of Laos' forests and their potential for biodiversity conservation have been declining steadily during the past several decades. In the face of the threat, the Government, aided by the international community, has created the National Protected Area System on a significant part of its territory. The degree of effective protection within the protected realm, however, is relatively low. This, plus the fact that not all of the designated protected areas were in good conditions to start with, has lowered the effectiveness of the Government's countermeasures.

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5. Land Degradation

5.1 The context

118. Laos is predominantly rural and has about 5.9 million ha of potentially cultivable land.(FAO 2000), of which 800,000 ha are cultivated for rice or secondary crops under both lowland, terrace- and upland shifting cultivation systems. Pastureland makes up another 15% of the cultivable land. Upland areas, defined in Laos as landscapes with a slope greater than 12 percent, cover between 80 to 85 percent of the country's area. Shifting cultivation is common in most of the hills and mountainous areas in the northern and central eastern part of the country.

119. Land degradation takes several forms, such as nutrient depletion, structural decline and compaction, biological decline, chemical deterioration (e.g. salinization), and soil erosion. All of these are present in Lao PDR. Tropical forest soils, especially on steep slopes, are particularly prone to degradation once the forest cover is removed. Most land degradation in Laos is associated with shifting cultivation, particularly in areas where population pressure has led to a significant decrease in the rotation period or where traditional lowland farmers encroach on neighboring uplands to make up for low and often declining yields on their lowland paddy fields.

120. There are other problems not normally associated with land degradation. One is the degradation –or outright loss-- of land due to unexploded ordinance. This topic is covered in greater detail in the section dealing with the management of hazardous substances. Here it is a simple reminder of this factor and its importance in the Lao context.

5.2 State

The Indicator: Sediment Load in selected Rivers – 1989 to 1995

121. The overall state of land resources, especially its vulnerability to erosion, can in principle be established by reference to sediment loads recorded in the rivers of the relevant watersheds. The indicator, needless to say, is not ideal but it could provide a partial idea of the underlying situation. Leaving out the Mekong itself the conditions of which are affected by factors extending well beyond Laos, the time series of selected sedimentation readings is summarized in Table 2.5.1 below.

122. The concentration of suspended sediment seem to be decreasing over time with a significant drop in 1995 corresponding to the construction of a new dam in the Mekong River tributaries.

Table 2.5.1: Suspended Sediment Flow in Selected Rivers

Station	Sediment (mg/l, the highest of wet season readings) 1989	1990	1992	1995	1997	2000
Mekong at Luang prabang	300	1,484	680	1,185	477	440
Mekong at Vientiane	1,731	1,884	786	3,013	-	-
Mekong at Pakse	296	1,052	300	376	-	-
Nam Ou at Ban Hatya	3,492	528	108	341	-	-
Nam Sebangfai at Ban Sebangfai	142	330	89	201	-	-
Nam Sebanghieng at Ban Kongdone	312	428	518	420	-	-
Sedone at Ban Souvannakhili	480	382	290	350	-	-
Sedone at Damsite	221	384	2,246	476	-	-
Nam Lik at Tha Lath	254	346	241	315	-	-
Nam Ngum at Damsite	21	34	60	10	-	-
Nam Ngum at Tha Ngone	56	162	96	99	-	-

Source: MRC, 2004. Water Utilization Project and Environment Programmed. *Transboundary and Water quality Issues in the Lower Mekong Basin*. Draft Final Report. . MAF/DOI 1997: Data on Water Quality

Suggested rating: Average with undetermined trend

Justification: While it is relatively easy to identify and quantify the change in the principal drivers of deforestation, the link between deforestation and land degradation is much more difficult to quantify and generalize about. Indicators such as the time profile of sediment readings in Lao rivers do not yield a clear picture of the trend in land degradation.

5.3 Pressure

123. It is accepted in Lao PDR and other GMS countries that deforestation is the precursor of land degradation. The pattern of deforestation was discussed earlier under "forest resources". The rate of deforestation correlates well with indicators of land degradation as measured, for instance, by the changes in the soil loss per ha. In principle, therefore, the rate of deforestation could be used as a proxy for land degradation. To the extent that deforestation is driven by population growth, population growth could also be used as an indicator of pressure leading to land degradation.

The Indicator: Number of Upland Households Practicing Shifting Cultivation – 1995 to 2004

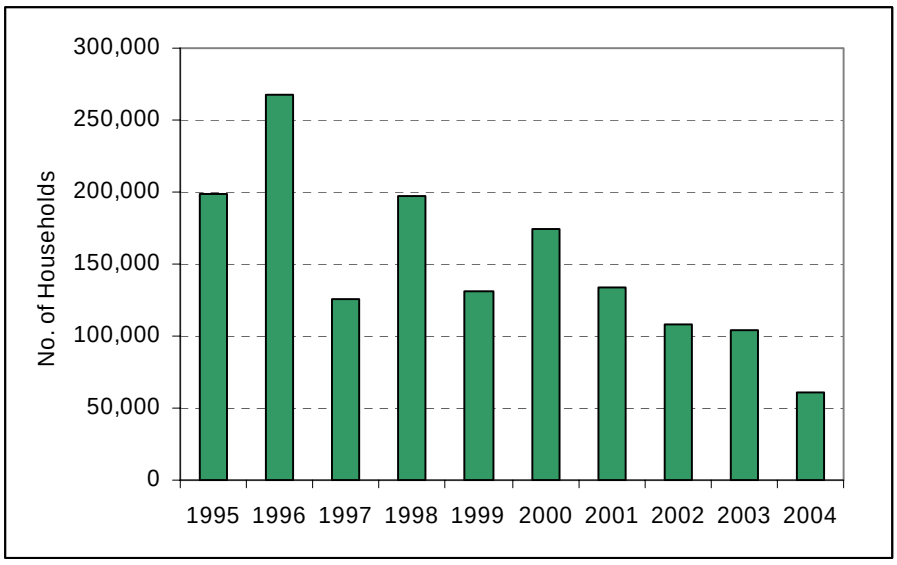
124. However it is shifting cultivation that may well be the most potent of the land degradation forces (but others such as inappropriate farming practices in general or clearing of forest for perennial crops should not be dismissed). For that reason, in this EPA, we have returned to the estimates of the number of upland households engaged in shifting cultivation as our pressure indicator. In general, shifting cultivation is a sustainable system only as long as cultivation

periods are short, and separated by long fallow periods of 10 to 15 years or more. Yet the average fallow period in most mountainous areas of Laos in the 1980s of 4 to 5 years only has been further reduced to only 2-3 years during the last decade because of high population pressure, government restrictions on forest clearing, competing land-use objectives and concentration of people near road and river access.

125. Farmers are increasingly clearing fields in young re-growth forest and are unable to employ adequate fallow periods. The consequent soil erosion and proliferation of weeds and pests (e.g. insects and rodents) result in low yields. The cycle of degeneration that is forcing farmers to cultivate smaller and less productive fields is truly a poverty trap. In the uplands of Lao PDR today many shifting cultivators are experiencing increased poverty and uncertain prospects.

126. An estimated 280,000 families practiced shifting cultivation in 1989, and an average of more than 300,000 ha were cleared and planted under shifting cultivation annually from 1982-1989, according to the National Shifting Cultivation Program Survey. With increased development efforts being directed at the uplands in the 1990s, the area under shifting cultivation decreased to 176,605 ha (267,274 households) in 1996 and to 61,097 ha (104,136 households) in 2004 (see Figure 2.5.1). The decrease in the scale of shifting cultivation was recorded mainly in the central and southern provinces, which are provinces situated along the Mekong corridor, endowed with large plains and having greater agricultural development potential.

Figure 2.5.1: Number of Upland Households Engaged in Shifting Cultivation – 1995 to 2004



.**Suggested rating:** High and decreasing

Justification: Shifting cultivation with a shortening fallow cycle has been a major factor behind land degradation in Lao PDR. However, its extent has approximately halved during the last decade although it cannot be excluded that the severity of the damage on a smaller area is greater than before.

5.4 Response

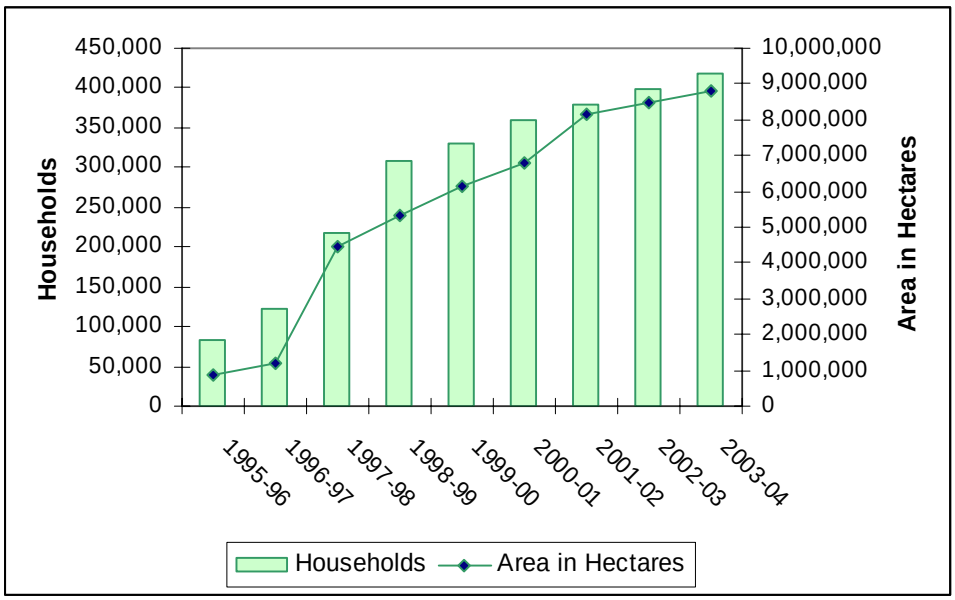
127. In the face of forest degradation mainly through shifting cultivation, the Government formulated Land Resource Management Policy in 1995 with the following aims:

- to gain a better understanding of land capability
- to implement community based resource management, coupled with a flexible land allocation policy based on physical characteristics, local needs and labor availability,
- to establish a low cost, integrated research and extension service to introduce more sustainable agriculture in the uplands
- to develop small and medium scale irrigation in the lowlands to reduce pressure on the lower uplands where more suitable agriculture, such as agro-forestry can then be promoted.

The Indicator: Number of Households under the LUP/LA Programmes – 1995 to 2003

128. The policy was translated into a Land Use Planning (LUP) and Land Allocation (LA) program that resulted in issuance of land occupancy entitlement to upland households and communities. Land allocation was combined with the mapping of land use and preparation of a national soil map. The implementation of the LUP/LA program produced the results summarized in Figure 2.5.2 below:

Figure 2.5.2: Number of Households under LUP/LA program – 1995 to 2003



129. The cumulated total of over 400,000 households represents about half of all rural households. In its scope, the program was nothing short of a land reform. Its impacts on agricultural productivity may be easier to measure than the impacts on environmental variables.

130. The sedentarization program has been accompanied by activities designed to diversity the upland farming systems and an emphasis on agro-forestry development. Its supporting elements have been (i) improving market access through feeder road development and market information delivery; (ii) land use zoning based on slope and land capability; and (iii) rural savings mobilization and credit extension.

Suggested rating: Significant and intermittent

Justification: Major efforts have been made by the government to promote sedentarization in upland areas centered on land allocation and a variety of supporting activities. The pace of land allocation fluctuated widely during the last decade but the continuation of the program seems in no doubt.

5.5 Conclusions

131. Fighting land degradation is an aspect of wider efforts to protect the country's watersheds and their vegetative cover. Shifting cultivation has been a major force affecting the state of Lao PDR's watersheds, its forest cover and the state of land resources. Between 1995 and 2004, land and forest land allocation program was implemented in 6,830 villages with 418,066 families, which is more than half of the total number of villages and families in the country. The total area allocated for stable management has reached 8,830,931 ha. This amounts to a creditable administrative and logistical performance by the country's authorities and Government field staff.

Suggested ratings: Two stars

Justification: There was a marked decrease in the second half of the last decade in the principal driver of land degradation, i.e. the extent of slash-and-burn farming. The Lao Government's policies appear to have played a major and positive role in this outcome. Given the lag between changes in the pressure factors and the resulting state, however, it is not altogether surprising that no clear pattern of environmental impacts has been observed yet.

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6. Inadequate Solid Waste Management

6.1 The context

132. For now, Lao PDR has few industries. Because of it, pollution issues are dominated by municipal ones, especially waste disposal and sewage treatment. Despite the relatively small total volume of waste generated by Lao PDR, the public health and environmental dimensions of waste management are recognized by the Government and increasingly also by the Lao society. The National Environmental Action Plan (or NEAP) (2000) envisages gradual expansion of waste management program from large to smaller towns without however containing any quantified targets. The general direction laid down in NEAP is (1) increased coverage of urban areas, (2) cost recovery including payments by households dependent on level of service, (3) investment in equipment and (4) an emphasis on organization and community mobilization helping to reduce the capital and running costs of the systems being put in place.

133. Waste management in Lao PDR is shared by national and provincial government, although primarily implemented through local authorities. Progress in waste management has heavily depended on donor support, including that of non-governmental organizations (NGOs) and private sector participation.

134. The average urban waste generation in late 1990s was estimated to be 0.75 kg per capita per day with a composition similar to that found in other developing countries (see Factsheet No.16). The proportion of organic waste is relatively low as most is used as animal feed (STEA & NORAD/UNEP, 2001). The overall picture is dominated by the situation in Vientiane and the largest of provincial capitals (see Table 17).

135. Management of hazardous substances is in its infancy in Laos (as discussed below) and most municipal and some rural wastes include varying proportions of hazardous substances. When describing parameters such as the volume of waste or waste disposal percentages, the non-toxic and toxic waste streams are combined, as they are, unfortunately in practice for the time being.

6.2 State

136. Until well into 1990s, only around ten per cent of urban households in Laos were estimated to be served by a waste collection service, Vientiane a partial exception (ADB, 2000). The situation seems to have improved somewhat, as explained below but the fundamentals persist. During the dry season, a large portion of the waste generated is burnt. Throughout the year, much waste is dumped in local water courses including the Mekong River. In most settlements, the solid waste that is collected is deposited in uncontrolled open dumps that are a significant environmental, aesthetic and health hazard.

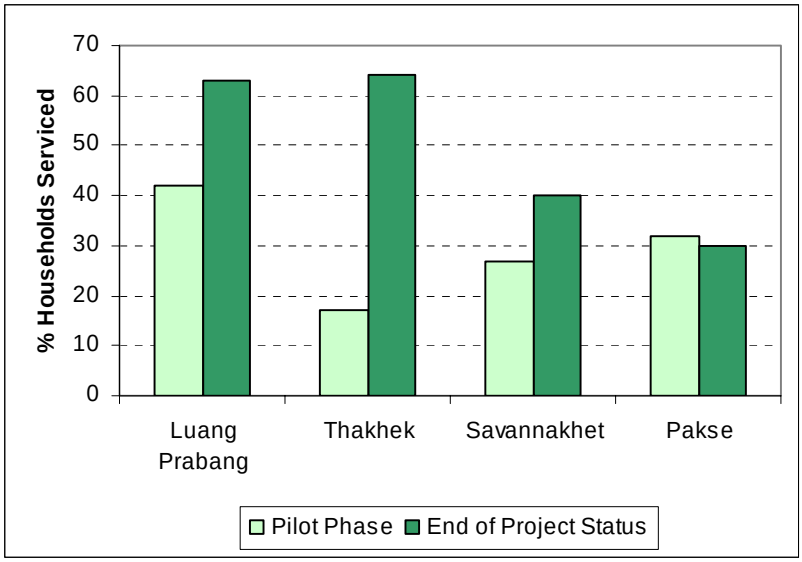
137. The waste dumped into canals exacerbates flooding and accumulation of stagnant water poses a significant health risk.

138. The sight of randomly scattered rotting waste, combined with the black, putrid water in stagnant drains reduces tourism potential and economic growth opportunities. At present, waste collection in Vientiane take place once a week. The frequency of collection is similar in other towns where organized waste collection exists. To this day, waste management infrastructure tends to be poorly funded, collection service unreliable and equipment inadequately maintained.

The Indicator: Percentage of Collected Waste

139. With foreign donor support, new waste collection facilities were established in four major towns at the end of the 1990s. Figure 2.6.1 summarizes the situation in the four "project towns" (Luangprabang, Thakhek, Savannakhet and Pakse). The coverage has steadily increased since the completion of the pilot phase in the 1999 and the end of the project in June,2002.

Figure 2.6.1: Percent of Households Serviced during Pilot Phase and at End of Project



140. At present, there are only five landfills in the whole of Lao PDR. Even these are inadequate and do not meet international environmental standards. Only Vientiane and Luangprabang have barely adequate separation of hazardous waste from the rest. The landfill in Vientiane Capital was established in 1998, with JICA's assistance. It is located 18 kilometers from the center of town and has an area of 62 hectares. It is projected to last for fifteen years, i.e. until 2013. The situation in the other four principal towns is summarized in Table 2.6.1.

Table 2.6.1: Landfills in the four Secondary Towns

	Luang Prabang	Thakhek	Savannakhet	Pakse
Date started	2002	2000	2000	2000
Site Area	15 ha	9 ha	13.5 ha	13.5 ha
Disposal Area	3.5 ha	2.2 ha	4 ha	2.2 ha
Source: MCTPC/UNDP/NORAD LAO/96/006: Solid Waste Management in Secondary Urban Centres of Lao PDR				

141. The operations of landfills are subject to significant seasonal fluctuations with volumes and weight increasing substantially during the rainy season (July to October) when burning of waste is difficult. The waste that is not taken to landfills is disposed of by informal private sector operators. In a small number of cases, the waste is sorted and some converted into fertilizer for agriculture or home gardens. The remainder is either burnt or dumped in low-lying plots or water bodies.

142. The existence of landfills in Vientiane and four secondary towns notwithstanding, collection in these towns is limited to accessible areas and profitable target groups such as markets and high-income households. The average collection rate in Lao PDR's five largest urban areas in 2002 was 45 percent. There was no waste collection to speak of in other towns and this brought the overall total of Lao urban households serviced to 10 per cent. (ADB, 2000).

143. While some information exists for Vientiane and the four "project towns", data about the situation in the rest of country (see Table 19 below for other important towns in Laos) are scant. Despite the progress that appears to have been made in actual waste collection in selected towns and partial reporting on that performance, the value of the indicator cannot be established for the time being. In the circumstances, the true state has to be described as unknown.

Suggested rating: Unknown

Justification: The pattern of waste collection is largely unknown except for five major towns of Lao PDR. This information is insufficient to characterize the overall state of waste collection in the country.

6.3 Pressure

The 1st Indicator: Urban Population

144. In 2003 Lao PDR remained a predominantly rural country. About 17% of the total population lived in urban areas. However, urban population has been growing rapidly, mainly as a result of migration to towns during in the past decade (see Table 2.6.2). The growing population and urban lifestyles increase the volume of waste.

Table 2.6.2: Urban Areas and their Population – 1995 to 2003

Province	Urban Area	Population	
		1995	2003
Vientiane	Capital City	288,999	300,804
Phongsaly	Phongsaly	5,145	5,183
Bolikhamxay	Pakxanh	13,325	18,660
Savanakhet	Savannakhet	63,610	63,634
Luangnamtha	Luangnamtha	13,079	16,205
Oudomxay	Xay	15,016	22,389
Bokeo	Houixai	12,030	13,757
Luangprabang	Luangprabang	38,416	40,797
Huaphan	Xamneua	11,693	15,391
Xayabouly	Xayabouly	20,013	22,622
Xiengkhouang	Pek	20,950	29,641
Vientiane Province	Thoulakhom	10,583	10,459
Khammouane	Thakhek	30,142	33,107
Saravane	Saravane	12,051	13,651
Sekong	Lamam	7,243	9,112
Champasack	Pakse	45,439	48,218
Attapeu	Xaysetha	10,758	10,809

Xaysomboun	Xaysomboun	3,693	6,009

Source: ADB/MCTPC, 2003. Lao Urban Data Book, National Statistical Office. 1995 Census Village Data Aggregated to urban Area.

The 2nd Indicator: Volume of Municipal Solid Waste

Table 2.6.3: Amount of municipal waste in Lao PDR's five main cities - 1999

City	No. of Inhabitants	Household waste (Tons/year)	Waste Generation per capita (Kg/week)	Other waste* (Tons/year)
Vientiane	300,804	77,000	4.48	20,805
Luang Prabang	40,797	8,000	3.88	1,100
Thakhek	33,107	5,400	2.84	1,100
Savannakhet	63,634	8,400	1.61	1,200
Pakse	48,218	5,700	1.73	9,000

Source: MCTPC/UNDP/NORAD Lao 96006, 2002. Solid Waste Management in Secondary Urban Centres of Lao PDR

145. The average production of waste in urban centers in Laos is 0.75 kilograms per capita per day, consisting of approximately 30% organic material, 30% plastic, 15% paper and 25% glass, cans and other metals (ADB, 2000). The quantity of organic waste is relatively low due to the use of this waste as animal feed (STEA & NORAD/UNEP, 2001). With average per capita production of waste changing slowly the population increases becomes the principal source of additional pressure on municipal waste management.

Suggested rating: Medium and increasing
Justification: The relatively low degree of urbanization has so far spared Lao PDR the problem of concentrated pressure exerted by growing volumes of urban waste. Nevertheless, as migration into towns gathered speed in the last decade, the problem of waste collection and disposal has become more acute.

6.4 Response

146. The Science Technology and Environment Agency (STEA) is responsible for waste management at the national level while the Ministry of Communication, Transport, Post and Construction (MCTPC) is in charge of urban waste management. Ministry of Public Health (MoH) has special responsibility for hospital and health sector wastes and Ministry of Industry and Handicraft (MIH) is responsible for the management of industrial wastes.

147. Currently, there are no specific waste management regulations. However, the basic body of environmental law includes references to waste management. This includes:

- The National Constitution (1991, Art. 17): All Lao citizens must protect the environment and natural resources: land, subterranean, forests, fauna, water resources and atmosphere.
- The Environmental Protection Law (1999, Chapter 3, Art. 23 Prevention Measures and Pollution Control.) "…All kinds of littering are forbidden. It is required to allocate waste disposal sites, and to separate waste before its disposal. Technologies for waste treatment, recycling of waste into production, and reuse must be supported. It is forbidden to import, transport, and move any kind of hazardous waste through land, water and sky border of the Lao PDR."
- Decree on the Implementation of the Environmental Protection Law (2002, Chapter 4) Article 14: Environmental Quality Standard and Article 15 Protection and Pollution Control.

The Indicator: Expenditure on Waste Management

148. The operating cost of waste collection is largely financed by the users, based on service fees the levels of which in 1999 and 2004 were as follows:

Table 2.6.4: Waste collection fees by category (kip/month) – 1999 and 2004

Year	Households	Business	Hotels, etc.	Market Places	Others
1999	2,000-5,000	>10,000	30,000- 300,000	200,000-1M	5,000-20,000
2004	6,000-8,000	30,000-100,000	100,000-500,000	500,000-800,000	8,000-10,000

Source: MCTPC/UNDP/NORAD Lao/96/006: Solid Waste Management in Secondary Urban Centres of Lao PDR

149. Beside a modest Government budget funding of waste management a number of foreign funded projects implemented during the last decade contained waste management components of varying sizes. The projects in Vientiane included:

- *Rehabilitation of the Sihom Area*: A pilot project assisted by the United Nations Capital Development Fund (UNCDF) ($3.0 million) and the United Nations Development Programme (UNDP) ($1.7 million), included a small waste disposal component providing plastic bins on concrete pads (ADB, 2000).
- *Vientiane Integrated Urban Development Project*: An ADB supported program to upgrade Vientiane's infrastructure, supported by a 10-year $93.0 million loan. The waste management component amounted to approximately $25.0 million (ADB, 2000)
- *Improvement of the Solid Waste Management in Vientiane Urban Area*: A Japan International Cooperation Agency (JICA)-assisted project to improve the dumping site for solid wastes at kilometer 18, northeast of Vientiane with a budget of $5.6 million (ADB, 2000; Nanthanavone, 2002).

150. The projects in secondary towns included:

- *Secondary Towns Integrated Urban Development Project*: This $25.0 million ADB loan project supported several types of urban improvements in Luang Prabang, Pakse,

Savannakhet, and Thakhet including an indirect support to solid waste management (ADB, 2000).

- *Solid Waste Management in Urban Centers of Lao PDR* : This project focused on solid waste management of Vientiane Capital and four secondary towns in Lao PDR during the years 1997-2002 with a budget of $19.9 million. Activities included the purchase of waste collection vehicles, the establishment of landfills and training on waste management issues including composting and recycling. The project was implemented through the Ministry of Communications Transport, Post and Construction (MCTPC) and funded by a NORAD trust fund administered by the UNDP (MCTPC/UNDP/NORAD, 2000; Keohanam, 2002; Thaiphachanh, 2002).

151. Total funding available for waste management during the last ten years are summarized in Table 2.6.5 below, with an uncomfortably large number of gaps in the information available:

Table 2.6.5: Expenditure on Solid Waste Management in Lao PDR, 1997-2004

	1997	2000	2001	2002	2003	2004-05
Government budget (STEA, MCTPC, MoH, MoI, SWMVT), operating and capital expenditure(million Kip)	120.0	200.0	70.0	68.0	140.0	1,575.0
Foreign funded projects (million $)	5.6	n.a	7.3	4.5	2.5	n.a
1. UNDP Sihom (million $)	n.a	4.7	n.a	n.a	n.a	n.a
2. Vientiane Integrated ….ADB (million $)	n.a	n.a	0.01	0.005	0.105	n.a
3. SWM for Vientiane Poor ADB/UNDP (million $)	n.a	n.a	n.a	n.a	n.a	1.0
Source: MCTPC/DHUP/SWM.VT, 2001. Investment planning for the year 2001-2004						

Suggested rating: Average and sporadic.
Justification: The expenditure on municipal waste management increased significantly during the last decade, the bulk provided by international donors. Although significantly increased, the level of investment is at best average, in relation to the past neglect of waste management capacity. The funding largely depends on the generosity of foreign donors and is not predictable.

6.5 Conclusions

152. The quantity of solid waste, especially in the rapidly growing towns of Laos continues to increase. In a small number of cases, including the principal cities, the waste management capacity has more than kept up with the population increase but the same has not been the case in other urban areas. On the whole, the management of solid wastes was poor in Lao PDR despite some improvements in landfill establishment in secondary towns between 2000 and 2002. A somewhat greater (but still very low) percentage of urban waste is collected now than it

was in the early 1990s. The quality of the disposal continued to be inadequate. Waste disposal in smaller towns relied entirely on ad hoc and environmentally poor local solutions.

153. Until now, the Government has operated without a clear policy on waste management (and hazardous waste management) and without clear operational guidelines. STEA/SEM's Action Plan for Hazardous Chemicals 2005-2020 is described in Section 7 dealing with hazardous waste.

Suggested rating: One-star

Justification: Solid waste management has improved in the principal towns of Lao PDR during the past decade but information is insufficient to assess the performance for the country as a whole. The low rating in part reflects the continued inability to generate sufficient data to make a balanced assessment possible.

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7. Inadequate Hazardous Waste Management

7.1 The context

154. With a greater integration of Lao PDR into the global economy, the use of hazardous substances in the country has increased. The largest category by volume is agricultural chemicals several of which are toxic. There are other types of hazardous wastes (see Table 23). Sanitary landfills exist only in Vientiane and four secondary towns (Luangprabang, Thakek, Savannakhet and Pakse). In Vientiane, hazardous wastes are separated from the main disposal area inside the landfill perimeter. In Luangprabang, a special fenced-off area for hazardous waste disposal exists. Everywhere else, hazardous wastes are mixed with the non-hazardous waste.

Table 2.7.1: The Principal Sources and Types of Hazardous Waste in Lao PDR

Sectors/ Exposure areas	Type of waste
Agriculture: Planted areas, crop storage areas	Herbicides, insecticides, rodenticides, used chemical containers
Households	Used fluorescent tubes, some batteries, drugs, cosmetics, vehicle materials
Hospitals or Clinics: consulting rooms, operation Theaters, hospital wards, laboratories	Infected human tissues and organs, excreta, blood, sharp instruments, laboratory equipment and tissue cultures, drudges
Commercial establishments: Vehicle servicing, dry cleaning, electrical transformers	Oils, hydraulic fluids Halogenated solvents Polychlorinated biphenyls (PCBs)
Small-scale industry: Photo finishing, textile processing, printing, leather tanning	Solvents, acids, silver, cadmium, mineral acids, solvents, inks, dyes, chromium.
Source: MCTPC/UNDP/NORAD LAO/96/006: Solid Waste Management in Secondary Urban Centres of Lao PDR.	

155. Relatively little is known in Lao PDR about hazardous substances (HS). An inventory of hazardous substances, monitoring of trade, use and handling of HS is a prerequisite of a good safeguards policy and practice. Many of the hazardous chemicals continue to be harmful a long time after their application.

156. Of emerging concern in Laos is lead production and rudimentary metal smelting, and releases of mercury, cyanide, copper, cadmium and other heavy metals associated with mining activities. Surface water quality in areas downstream of industrial and mining activities increasingly need to be monitored to avoid potential human impacts.

157. There are special factors to consider also. One is the uncertain effect of past releases of toxic substances. Significant quantities of dioxin were released on the territory of Lao PDR during the Indochina War. More than 200,000 gallons or 1.8 million m3 of herbicides were

sprayed within a six-month period in the mid-1960's, some on Lao territory, producing dioxin as a by-product. (ERI/STEA, 2004). Unfortunately, information is limited on the extent of dioxin contamination that remains today in the country. The second special consideration is the extent of unexploded ordinance, a special type of hazard, looked at in more detailed below.

7.2 State

158. There is very little separation of hazardous waste from other solid waste in Laos as pointed out previously. In these circumstances it is reasonable to expect adverse public health impacts. Unfortunately, there are no reliable data in Lao PDR of sickness or death episodes linked to the use of agricultural or other hazardous chemicals.

The Indicator: Number of UXO-related Accidents

159. By contrast, relatively detailed data exist on UXO-related accidents and fatalities. Using these data as an indicator of the seriousness of the hazardous substances problem in Laos amounts to selecting a rather special form of hazard as a yardstick. However, the same indicator is a reasonable proxy for some other types of hazard such as past exposure to war-time chemical contamination.

160. A total of 90 accidents involving 194 people were reported in 2004 in the 9 provinces where UXO Lao (agency responsible for de-mining) operated. Sixty-six people were reported to have died and 128 people were injured. Males were involved in 85% of accidents and children in 57.7% of the accidents (UXO Lao Programme Progress Report, 2004). The data are summarized in Table 2.7.1 below:

Table 2.7.1: UXO-related Accidents and the Progress of UXO Clearance - 1997 to June, 2005

	1997	2001	July 2005
Number of UXO-related incidents and fatalities (average of 5 preceding years)	29	57	76
Cumulated area cleared of UXO	158.8100	1,032.7037	2,102.6493
Source: UXO Lao Annual Summary Report of UXO Accident			

Suggested rating: Average and deteriorating

Justification: Recent numbers of UXO-related accidents were significantly above the levels of five to ten years ago. Anecdotal evidence suggests that high-risk behavior of villagers involved in the scrap metal trade could be part of the explanation. The "average" rating is based on a comparison with other countries experiencing similar problems (e.g. Vietnam or Cambodia)

7.3 Pressure

161. Herbicides and pesticides are used only in moderate amounts in Lao PDR (compared, for instance, with the Thai total of 25 million tons imported in 2002 or about 0.5 kg per capita p.a.) mostly as a result of low per-capita income and predominance of traditional agricultural practices in rural areas. Customs data (Table 2.7.2 below) show a decreasing trend in the

import of hazardous substances during the past decade. However it is believed that some pesticides banned in other countries are still being imported into Laos without accurate information about which ones and in what quantities. In addition the sharp decline in the import of hazardous substances between 1993 and 1997 has demands explanation.

162. The past relative neglect of hazardous substances management at a policy level was mentioned earlier in connection with solid waste management. This situation is beginning to change: The National Hazardous Chemicals Strategy up to 2020 and Action Plan for the years 2006-2010 is being submitted to the GOL for approval by the end of 2005. It spells out the actions and measures to be taken to improve the management of hazardous substances in Lao PDR. A pilot Inventory of hazardous substances in Lao PDR was implemented in 2004 by STEA.

The Indicator: Volume of Imported Toxic Substances – 1991 to 2003

163. Lao PDR's ratification of the Stockholm Convention and increased attention to one category of hazardous substances, i.e. persistent organic pollutants (POPs) such as dioxins, furans, and polychlorinated biphenyls (PCBs), has given impetus to hazardous waste management as a whole. In May 2003, STEA established a POPs Committee with representatives from line ministries (Department of Agriculture, Department of Industry and Handicraft, Department of Food & Drugs, Department of Health etc.). Furthermore, STEA's Environmental Research Institute (ERI) is the national focal point for a POPs enabling activities project, implemented through UNIDO, and with financial support from GEF (Global Environment Facility). The aim of the project is to strengthen national capacity and enhance knowledge and understanding amongst decision-makers, managers, the industry, NGOs and the public at large on POPs and to develop and formulate a National Implementation Programme (NIP).

Table 2.7.2: Volume of Imported Hazardous Substances – 1991 to 2004

	1991-1992	1993	1997	1998	2004
Customs value of imported hazardous substances (tons)	102.0	63.3	4.8	3.7	3.0
Source: MAF/DOP, 1998. MOH/MAI, 2005					

Suggested rating: Low and decreasing.

Justification: The usage of herbicides and pesticides in Lao PDR is still at a moderate level compared to the neighbouring countries. The "average" (rather than "low") rating is chosen despite the modest levels of hazardous substances' use because of insufficient control over the types of hazardous substances used and insufficient public awareness of the risks involved.

7.4 Response

The Indicator: Area Cleared of UXO's – 1997 to 2004

164. In the area of UXO clearance, the United Nations Country Team (UNCT) continued to provide support to the national Unexploded Ordnance Program ("UXO Lao"). Eighteen international donors continued to provide cash and in-kind contributions, with the UXO Lao Trust Fund raising close to 3 million dollars for activities in 2000. In the same year, 751.2 hectares of agricultural and other land were cleared in nine provinces, and 80,640 items of UXO (bombs, mines and other UXO) were destroyed. 159. 964 villages were visited as part of the UXO community awareness campaign. In 2002, 842.5 hectares were cleared by UXO Lao and a total of 98,963 UXOs (bombs, mines and other UXO) were destroyed (UXO Lao Progress Annual Summary Report) The progress of work over time is summarized in Table 2.7.3 below: Despite these efforts, the task is far from finished. UXO is found in 15 out of 18 provinces and 93 of 134 districts in Laos, based on a survey in 1996-97. In the last seven years a total of 3,500 hectares has been cleared.

Table 2.7.3: Cumulated Area Cleared of UXO's – 1997 to 2004

	1997	2001	July 2005
Area cleared of UXO at the end of year (hectares)	158.8	873.9	1,069.9
Source: UXO Lao Progress Annual Summary Report			

165. The mandate of UXO Lao will be modified to reflect its new responsibilities as strictly a UXO/mine clearance operator. In 2004, summary achievements of UXO-Lao made the following achievements against annual target: Community awareness (CA) teams visited 495 villages reaching 125,341 people, 100.8% of the UXO annual target. Roving clearance teams visited 1,570 villages (141.6% of the annual target) and destroyed a total of 50,203 items of UXO (654 big bombs, 26,702 bombies, 213 landmines and 22,643 other items of UXO).

166. UXO Lao's National Steering Committee initiated a strategic planning process, involving consultations with representatives of line ministries concerned, UN and donors. The process is to outline the Government's approach to UXO/mine problem up to the end of year 2013, targeting the nine most affected affected provinces of Savannakhet, Xiengkhouang, Saravan, Khammouane, Sekong, Champasack, Houaphan, Attapeu and Luangprabang.

167. Among the priorities of the National Poverty Eradication Programme (NPEP) is to enable "people from the most highly impacted communities to live free from the impacts of landmines and UXO". Those impacts will be reduced by a combination of clearance operations, of Mine/UXO Risk Education activities, assistance to survivors of mine/UXO accidents and marking off of lower-priority areas for later clearance.

Suggested rating: Low and consistent

Justification: Thirty years after the end of hostilities in Indochina the problem of UXO is far from solved despite steady efforts of the Lao authorities to deal with the problem. The UXO is admittedly an imperfect proxy for the wider problem of hazardous substances but in either case there is considerable room for improved performance.

7.5 Conclusions

168. Management of hazardous substances in Lao PDR remained weak despite some progress in special segments of the activities, i.e. management of unexploded ordinance. For the most part, hazardous waste continued not to be separated from other types of solid waste let alone being treated and disposed of appropriately. The relatively small and possibly declining per capita volume of hazardous substances has masked the problem of insufficient knowledge about the pattern of past and current use, and poor control over imports of substances banned elsewhere.

Suggested rating: One star

Justification:.Recent surge in activities relating to hazardous substances management comes too late to affect the assessment of performance that always relates to the past, not the possibility of future improvements. Past performance contained creditable elements, for instance the steady pace of UXO-related operations, but very little was done to manage the more common types of hazardous substances.

References

- *ADB/MCTPC, 2003. Lao Urban Data Book*
- *MCTPC/UNDP/NORAD LAO/96/006: Solid Waste Management in Secondary Urban Centres of Lao PDR.*
- *STEA/SEM, 2005-2020. Action Plan for Hazardous Chemicals*
- *STEA/SEM, 2004. Inventory of Hazardous Chemicals in Lao PDR. A Pilot Project.*
- *STEA, 2004. Lao Environment Monitor.*
- *Lao PDR, 2002. Lao PDR Landmine Monitoring Report*
- *Lao PDR, 2002. Landmine Monitor Report and Lao Urban Data Book, 2003.*

8. Climate Change

8.1 The context

169. The Lao PDR is a signatory of the UNFCCC and a party to the discussion about the sources of GHG emissions and impacts of global warming.

8.2 State

170. The status of climate change is determined by factors that are overwhelmingly outside the control of Lao or GMS authorities. In principle, a single report on climate changes is prepared for the whole world by the likes of IPCC (Intergovernmental Panel on Climate Change). For that reason, this EPA report does not attempt to formulate a separate state indicator at a national level.

8.3 Pressure

The Indicator: Volume of GHG Emissions - 1990

171. A greehouse gas (GHG) survey conducted by STEA in 1998, established the baseline of CO_2, CH_4, CO, N_2O and NOx emissions and GHG sinks under the following categories: Fossil fuel combustion, traditional biomass burned for energy, rice cultivation, enteric fermentation and manure management, changes in the stock of forest and other woody biomass, forest and grassland conversion, landfills and waste water.

172. The results (see Table 2.8.1) show that Lao PDR was a net CO_2 sequester. Biomass burning dominated the CO2 emissions. Methane emissions are largest in the agriculture sector followed by the forestry sector. The agriculture sector accounted for about 86 percent of the country's methane emissions in the late 1990s, with rice cultivation accounting for 50 percent of the total.

Table 2.8.1: Lao PDR 1990 Greenhouse Gas Inventory Results.

Energy Sector	**CO_2**	**CH_4**	**CO**	**N_2O**	**NOx**
1. Fossil fuel consumption	414.90				
2. Traditional biomass burned for energy		22.75	157.92	0.12	4. 18
Agriculture	**CO_2**	**CH_4**	**CO**	**N_2O**	**NOx**
1. Enteric fermentation		97.92			
2. Manure management		14.38			

3. Rice cultivation		158.97			
Forestry	**CO_2**	**CH_4**	**CO**	**N_2O**	**NOx**
1. Change in forest and woody biomass	-121,614.00				
2. Forest conversion: Aboveground CO_2 released from on-site burning	6,752.67				
3. Forest conversion: Aboveground CO_2 released from off-site burning	628.16	29.50	257.80	0.20	7.30
4. Aboveground CO_2 release from decay	9,247.84				
Forestry and Land Use Change	**CO_2**	**CH_4**	**CO**	**N_2O**	**NOx**
1. Landfills		11.20			
2. Waste water		0.23			
Total (see note below)	**-104,570**	**334**	**416**	**0**	**11**
Note: These totals may not agree with the First National Report					
Source: Lao PDR First National Report to the UNFCC Convention, October 2000 and STEA, 1998. GHG Inventory for Lao PDR					

173. No previous or subsequent survey of GHG emissions has been conducted and no trend in the emissions can therefore be established for the time being. The indicator identified has a limited value but has the merit of bringing together, in a single factsheet, all that we know about GHG emissions in Laos today.

174. The emission inventory of GHG was developed for four of the six sectors mentioned in the IPCC guidelines namely energy, land use change and forestry, agriculture and waste. The emissions are estimated for CO_2(carbon dioxide), CH_4 (methane), CO(carbon monoxide), N_20(nitrous oxide), and NOx (oxides of nitrogen) for the year 1990.

175. Table 2.8.1 indicates that in 1990, CO_2 emissions associated with burning of wood and biomass dominated the picture of overall emissions. These were only in small part offset by carbon sequestration by the growing forest biomass. As elsewhere in the rice-growing South-East Asia, the irrigated paddy sub-sector generated methane emissions.

8.4 Response

176. Industrial and other developments over the last century have led to a significant increase in emissions of carbon dioxide, methane and other carbon based gases. This harmful trend has largely been traced to the use of fossil fuels, decomposing organic matter and the continued destruction of forests. The rise in emissions of these so-called Greenhouse Gases (GHG) results in a gradual increase in global temperatures, leading to changes in the environment including increased desertification and rising sea levels across the globe.

177. In 1992, the Rio Earth Summit began to address the issue of global climate change. The UNFCCC was drafted, and many countries pledged to act against the possible future threat by decreasing GHG emissions. This pledge was reiterated at the Kyoto conference.

The Indicator: Expenditure on Reducing the Amount of Slash-and-Burn Farming – 2001 to 2005

178. The principal means of meeting the spirit of its obligations under UNFCCC for the Government of Lao PDR are its policies and measures aiming to reduce the extent of slash and burn farming, the single most important source of GHG emissions in Laos. Indeed the expenditure by the Government on various measures that pursue this objective is believed to be a suitable indicator of response. The values of this indicator are given in Table 2.8.2 below:

Table 2.8.2: Expenditure on Reducing the Extent of Slash-and-Burn Farming – 2001 to 2005 (million kip)

	2001	2003	2005
Government budget on sedentarization and other relevant program	11,000	13,915	17,923
Source: MAF, Shifting Cultivation and Implementation Planning (2001-2005)			

8.5 Conclusions

179. Lao PDR is a minor "player" in the global climate change development. Nonetheless its net contributions to GHG emissions were not negligible in recent years, mainly on account of widespread practice of slash-and-burn farming and a widespread use of fuel wood. The responses of the Government rightly targeted the principal sources of emissions (slash-and-burn).

Suggested rating: One-star
Justification: Lao PDR does not contribute significantly to the overall quantity of greenhouse gas emissions even though it is a net GHG emitter. Thus, its ratification of the UNFCCC in January 1995 was primarily symbolic and had political value. The low ranking is justified by the absence of any update on the work done 7 years ago that established a 1990 benchmark that is now 15 years old.

References

- *Lao PDR. 1991 Constitution of Lao People Democratic Republic*
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- *MDG, 2004. Progress report on Millennium Development Goals Jointly prepared by the Government of the Lao PDR and the United Nations.*

- *MAF/NAFRI, 2003. . Upland Agricultural Development in the context of Livelihoods, Watersheds and Governance for area-based development projects in the Lao PDR*
- *MAF, Shifting Cultivation and Implementation Planning year 2001-2005*
- *STEA, 1998. GHG inventory for Lao PDR*
- *STEA, 1994. Environmental Action Plan*

III ENVIRONMENT AND ECONOMIC DEVELOPMENT: CROSS-CUTTING ISSUES IN EPA

3.1 Introduction

180. Last two years was another period of GDP growth in Lao PDR (see Table 3.1). Both GDP and collection of revenue continued to improve and an increased share of annual budget was transferred to provinces in principle improving the Government's capacity to assume additional financial responsibilities related to environmental management. This fact notwithstanding, the bulk of environmental expenditure continues to be financed by international donors and therefore –unlike in Thailand or Yunnan Province of PRC, for instance-- the observed environmental outcomes and performance of Lao Government during the last ten years or so was affected to a significant degree also by the volume, structure and management of foreign assistance reaching Lao PDR.

Table 3.1: GDP Growth and its Composition – 1990 to 2005

Composition of GDP by sector		Year							
		1990	1995	1996	1997	1998	1999	2000	2005
GDP at constant prices	GDP%	231.0	262.1	109.2	130.6	248.2	566.92	698.18	n.a
Agriculture	GDP %	60.7	54.3	52.2	52.2	51.8	52.2	51.8	46.4
Industry	GDP %	14.4	18.8	20.6	20.8	21.9	22.0	22.6	23.6
Services	GDP %	24.1	24.5	24.8	25.0	25.3	25.2	25.0	30.1
Source: SPC/NSC, 2005. Basic Statistics Data									

181. Several macroeconomic trends and structural features of the Lao economy influenced the environmental performance during the last decade. First, the last decade saw continued expansion of commercial agricultural production that was extended to about 150,000 ha last year. This growth was well within the limits of Lao PDR land and water resources and did not appear to have had adverse environmental impacts associated with shifting cultivation described in Part II.

182. The role of biodiversity and natural resources in Lao PDR's economy, especially their contribution to government revenue and export earnings, continued to be greater than in other GMS countries. (NBSAP, 2004). Conservation of these resources is therefore viewed with greater seriousness in Laos even when it coexists with the development of new sectors of the economy.

183. The Government policy has long favored industrialization. The number of industrial establishments, though remaining modest by sub-regional standards, increased from 15,931 in 1997 to 29,200 in 2004. The growth of small and medium scale facilities has increased the environmental monitoring duties of the Government. The ability of the Government to enforce environmental safeguards in these enterprises remains in doubt.

184. Indicative of the Government's concern with deforestation, solar energy made a modest entry into Lao PDR during the last decade and nearly 5,000 remote rural households (out of the

total of almost 800,000 in Lao PDR) are now served by solar energy. This does not mean that the environmental concerns related to energy generation and supply have shifted away from hydroelectricity. Its vital role in Lao economy and the importance of its environmental dimension remain uncontested.

185. The improved provision of clean water to both urban and rural population was described in Part II and this was closely matched by a gradual increase in the number of sanitary and health stations in the country.

186. Sustainable natural resource management and environmental protection have featured as State priority for at least a decade. In the last five years, in addition, they were more closely linked to efforts to reduce poverty. Programs such as community forest management attempted simultaneously to improve the environmental conditions and the wellbeing of the local populations.

187. In managing renewable resources, several directions emerged during the reviewed period. In the case of inland fisheries, the trend was towards making a better use of available technical know-how including pond management and development of fish feeds. Emphasis was also on strengthening integrated and participatory extension systems including adaptive research, rehabilitation and establishment of fisheries research centers, development of improved varieties of inland fish and fish fry production on a communal basis.

188. In forest resource management, the policy emphasis shifted from meeting industrial demand to safeguarding supplies into the future. Participatory tree planting was promoted to strengthen the wood supply base, building on a relatively long experience in Lao PDR plantation management and promotion.

189. In the case of land resources, the main thrust was toward further development of land resources database and mapping. The objective was to consolidate all natural resource planning and management functions at the national level and strengthen natural resources management systems at the provincial and village/community levels. The former was substantively achieved, the latter remains very much “work in progress”. Beginnings were made on the preparation of agro-zoning classification maps.

190. Progress was made in the development of provincial and district land allocation capacity within area-based development programs (including NPAs). Participatory land-use planning procedures and capabilities also gained in importance. Integrated watershed management plans were completed for 8 priority northern watersheds.

3.2 Integration of Environmental Concerns into Economic Decision Making.

191. The policies favoring sustainable resource management in Laos go back to at least the first National Forestry Conference in 1989 that defined the steps needed to conserve and extend forest cover. The 1990s was a period of substantial legislative activity relating to the management of natural resources as well as environmental oversight of industrial and mining operations. As Part II illustrates, the results of these efforts have been mixed.

192. The establishment, in 1993, of the Science, Technology and Environment Agency (STEA), and the approval of the National Environmental Action Plan in 1994 were important landmarks. Others were the enactment of the Environmental Protection Law in 1999, and formulation (in 2002) of the National Forestry Strategy 2020, Sustainable Forestry and Rural Development Program, the National Environment Strategy and the National Biodiversity Action Plan 2004.

193. A more complete listing of the principal policy documents is given in Table 30 below. The scale of policy and strategy development is striking and some of the consequences of the furious pace of policy development are looked at further below.

Table 3.2: Key Environment Policy and Strategic Documents in Lao PDR since 1994

Title	National Agency
First National Environmental Action Plan (1994)	STEA
Draft National Resettlement Policy for Major Projects (1997)	CPI, STEA
Draft Public Involvement Guidelines	CPI, STEA
Sector Strategy & Guideline National Framework - Rural Water Supply & Environmental Health Sector	MPH
Water Sector Strategy and Action Plan 1999-2004	WRCC/PMO
Strategic Vision for the Agriculture Sector until 2010	DoF/MAF
Forest Vision for 2020	DoF/MAF
Hydropower Development Strategy	DoE/MIH
5th National Socio-Economic Development Plan (2001)	CPI
Agriculture Master Plan	DoA/MAF
Power Sector Environment Policy	DoE/MIH
Social Impact Statement for Electricity Projects	DoE/MIH
Agriculture and Forestry Sector Development Plan	MAF
Draft National Environmental Quality Monitoring Program (NEQMP) 2003-2010. Final Consultation Workshop, Vientiane, March 24, 2003.	ERI/STEA
Draft Policy on Resettlement	STEA
National Biodiversity Strategy and Action Plan, years 2010 and 2020. June 2004.	DoE/STEA
National Strategy on Environment Education and Awareness to the years 2020 and Action Plan for the years 2006-2010. June 2004	STEA
National Environmental Strategy years 2010-2020, August 27, 2004	STEA
National Growth and Poverty Eradication Strategy (NGPES) September, 2003	MFA

194. The principal laws relating to the environmental management and allocation of institutional responsibility are summarized in Table 3.3 below. Among other things the table illustrates the large number of principal Government stakeholders that, as a minimum, has called for coordination of efforts, always a difficult element in policy formulation and implementation and a critical factor affecting performance.

Table 3.3: Environment-related Laws of Lao PDR

Legislation and key ministry responsible	Scope	Key Contents
Forestry Law (1996) Ministry of Agriculture and Forestry	Principles, regulations and standards for the use of forest lands and resources Promotes the conservation and rehabilitation of forest resources Defines roles and authorities of forest management and inspection organizations.	GoL is responsible for administration and allocation of natural forests and forest lands. Approval from authorized agency is required for individuals and organizations to possess and use natural forests Individuals and organizations have obligation to preserve forest resources including water sources, marine animals and wildlife

Water and Water Resource Law (1996) WRCC, MAF	Management, exploitation, development, and use of water and water resources with the aim to protect and sustain them.	MAF is responsible for the survey and inventory of water resources Scale of water use is classified into small, medium and large. Permit is required for medium and large scale.
Land Law (1997) MAF, MIH, MCTPC, MIC, MND, MoInt, MF	Rules on management, protection and use of land.	All individuals and organizations have obligation to protect the land to ensure that there is no soil erosion, soil degradation and negative impact on the natural or social environment
Mining Law (1997) MIH/DGM	Mining and processing of minerals for local consumption and export	Licensees have obligations to preserve and restore the land utilized during mining and to rehabilitate the land after mine closure and to guarantee that the project shall have no serious negative impacts.
Environmental Protection Law (1999) STEA/DoE	Principles, rules and measures to manage, monitor, restore and protect the environment, natural resources and biodiversity Ensure the sustainable socio-economic development.	All persons and organizations residing in Lao PDR have an obligation to protect the environment. STEA is responsible for overall environmental oversight and coordination Each sector responsible for development projects shall issue its own regulations for EIA, based on general EIA regulation issued by STEA
Industrial Law (1999) MIH/DOI	Establishment and management of business in industry and handicraft sector	All businesses shall ensure the protection of the environment in accordance with EPL. Wastes shall be treated in accordance with the relevant MIH waste discharge regulations
Electricity Law (1997) MIH/ED	Standards of electricity administration, production, transmission, distribution, management of electricity exports arid imports	Operation of electricity production shall begin with a survey and project output and shall include the construction and expansion of the facilities, which ensure that such economic enterprise does not damage the environment, ecological system, living conditions, and natural habitat of wildlife:
Agriculture Law (1998) MAF/DoA/NAFRI/ NAFES	Principles, rules and measures for implementing and managing of agricultural production, to conserve agriculture to ensure that agriculture commodity production has no adverse environmental impact	
Urban Planning Law (1999) MCTPC/DoU	Principles, regulations and actions regarding management, land use, and building construction at the national and local levels. To ensure conformity of actions with the government policies and regulations.	MCTPC, in collaboration with concerned field offices and local authorities, is responsible for the investigation, design and submission of the plans to the government for consideration and in some cases to the National Assembly for approval.
Road Law (1999) MCTPC/DoT	Principles, rules and measures for managing, using, planning, surveying, and construction of roads. Road safety, including environmental protection. Objective of ensuring sustainability of seasonal traffic.	The Law promotes investment in road construction and repair and provides for favoured tax treatment of investors under linked to the Investment Promotion Law
Hygiene,	Principles, rules and measures	Every Lao citizen, irrespective of ethnicity, sex, age and

Prevention and Health Promotion Law (2001) MPH	related to public hygiene and health promotion	socio-economic status, or religious beliefs has the right to obtain health care, participate in the practices of hygiene, disease prevention and health promotion

3.3 Policy and Institutional Integration

195. The degree to which the institutional and legislative changes sketched above (and others) contributed to greater integration of environmental concerns into economic and political decision making in Lao PDR is not easy to generalize about. In some cases, namely in linking rural development with forestry, the interdependence of the management of renewable resources and improved livelihoods was clearly acknowledged. Elsewhere (e.g. industrial development policies), that linkage has not yet been made. Environmental considerations do feature in the influential (2003) National Growth and Poverty Eradication Strategy (NGPES).

196. Environmental legislation evolved quickly in Lao PDR and inconsistencies have surfaced in different legislative documents as a result of different ministries leading the development of sectoral legislation with insufficient inter-agency coordination in some cases. The principal faults are not very different from those found in some other countries: conflicting provisions, overlapping mandates given to different ministries, and lack of implementing regulations and supporting environmental standards. The reconciliation efforts of the Government started too late to meaningfully affect the performance during the last decade.

197. The idea of vulnerability and "coping" began to feature in existing policies and was recognized to be related to environmental variables and community organization beside the more common links made to widening of skills, improved provision of health services at the local level etc. Vulnerability assessments emerged as a tool of integrated local decision-making that is guided by economic, social, cultural and also environmental concerns. Vulnerability in Lao PDR continues to be related to food insecurity. The 'food for work' assistance of the World Food Program (WFP) continues to be important in Laos. Its complementarity with Lao PDR's environmental objectives, often mentioned, has not been well documented.

198. An important measure of integration was achieved in the course of the preparation of the NGPES. A Steering Committee was created in 2003 composed of all key ministries and agencies, including CPC, MOF, MOE, BOL, MOH, MOAF, MCTPC, STEA, National Statistical Centre, the Ethnic Minority Committee of the National Assembly and three mass organizations. STEA together with other agencies (e.g. MIH, MOC, MOLSW, DPA) played a part in the formulation of approaches to cross-cutting and/or thematic issues. The Steering Committee model remains of relevance to dealing with environmental concerns.

3.4 Environmental Expenditure and Financing

199. Environment expenditure is here defined as the expenditure undertaken by public institutions for the purpose of prevention, reduction, and elimination of environmental degradation and pollution, as well as natural resource management activities other than resource utilization or production.

200. Government expenditure in Lao PDR is normally categorized into: (i) wages and salaries; (ii) operations and maintenance; (iii) subsidies and transfers; (iv) capital expenditure; and (v) miscellaneous and contingencies, and aggregated at the ministerial or agency-level.

201. Expenditures on environment are not listed separately and here they have therefore been estimated from the budget FY 01/02. The resulting pattern of environmental expenditure is presented in Table 3.4 below:

Table 3.4: Public Expenditure by Sector (US$)

Ministry/Agency	Budget [2]FY 01/02	Units and Key Environmental Function	Estimated Environmental Expenditure FY 01/02	Environmental Expenditure for each Ministry / Office
STEA	105,576 ([3]FY03/04)	STEA (DOE and ERI) (Environmental Protection)	37,315 (FY03/04)	35.3%
MAF	8,200,000	DFRC (DOF), FRC (NAFRI), and part of NAFES (Forestry, Protected Area and Land Management)	1,246,909	15.2%
MIH	1,600,000	Environment Division (DOE and DOI) (Environment Protection in Industrial and Power Development)	69,514	4.3%
MCTPC	27,600,000	ESD (DOR and UDD (DHUP) (Environmental Protection in Transport and Urban Development)	279,794	1.0%
MOH	8,600,000	DOHDP and NEW (Environmental Health and Water and Sanitation)	362,316	4.2%
Total	46,105,576	**Total**	1,995,848	4.3%
Percent of Total Expenditure	14.6%	**Percent of Total Expenditure**	0.6%	
Source: Staff estimation based on information from STEA and Public Expenditure Review (PER), 2002				

Note: Total public expenditure in FY 01/02 was 316,070,000

[2] Exchange rate (FY01/02): 1 US dollar = 10,860 Kip. [3] Exchange rate (FY03/04): 1 US dollar = 10,370 Kip.

202. The data indicate that the overall budget allocation for environment remains extremely low. The expenditure of 0.6% of the total public expenditure is almost half of what some of the neighboring countries like Vietnam (0.8-1%) and Thailand (1.2-1.4%) spend on environmental protection. The gap between the objectives of policy and the Government's ability to reach them unassisted therefore remains large. Donor assistance has bridged some of the financing gap and contributed to a creditable environmental performance of the country during the last decade or so.

3.5 Implementation Issues

203. A number of measures were taken during the last decade or so to translate the intent of overall policies (to counter natural resources degradation and mitigate adverse environmental impacts) in Laos into reality. Among them was the enactment of the environmental impact

assessment legislation and regulation of wildlife trade in endangered species. In order to improve implementation, certain environmental functions of the Environmental Impact Assessment (EIA) were decentralized to provinces and a third-party monitoring protocol was established to report on environmental impacts of development projects. Other mechanisms included the creation of specialized agency (e.g. the agency to protect and manage the Nakai Nam Theun Watershed) and a series of steps to improve water and air quality monitoring. The government continued to promote sustainable management of its natural resource base, and promulgated a number of laws and associated implementing decrees. Area-based development gained in importance. The Ministry of Agriculture and Forestry began applying the Integrated Watershed Management (IWM) approach in 1999 to pursue the goal of sustainable management of natural resources. That required a major shift of attention to the planning process and its nature. In Laos, this takes place at the provincial level, where ranking of sub-watersheds and strategic options for a given large watershed is identified, and the district level where watershed zoning, more specific development interventions, buffer zone and conservation areas are discussed and agreed upon by district sub-sectors. Sub-sector plans are then based on the agreed direction given by the IWM Plan. No more than modest beginnings, however, were made in implementing the IWM process.

204. Despite the sound direction of the above and other initiatives, Part II suggested that their impact has often been less than expected. Many performance indicators continue to be mixed or show no clear direction. Where this is so (e.g. in continued forest cover loss, or waste management) the principal reason was probably the “thinness” of the budgetary and technical support given to the principal countervailing measures, some existing mainly on paper. The gap between the large, donor-driven, legislative and institutional agenda, and the financial resources made available to implement it grew even wider in recent years. To say that existence of implementation capacity commensurate with the policy ambitions is a precondition of good performance is not very original but it bears repeating.

205. Elsewhere (especially in relation to forest use) the outcomes may have been affected by the high enforcement cost in a sparsely populated country. Weak implementing regulations and supporting environmental standards was the reason in other cases.

3.6 Institutions and Instruments

3.6.1 Regulatory and Economic Instruments

206. The heart of the environmental regulatory structure in Laos is the 1999 Law on Environmental Protection and STEA 1999 Regulation on Environmental Assessment (EA). The Regulation establishes uniform environmental assessment requirements and procedures for all development projects in the Lao PDR. Substantial work was accomplished during the last three five years in converting the Regulation into operational guidelines but the meaningful EIA work in Laos did not start until the very end of the reviewed period.

207. The regulatory structure is supported by a system of environmental quality standards. Most standards were formulated in the 1990s but significant gaps in the coverage exist. The practical importance of the standards in day-to-day activities of the environmental regulators remained low, however. No significant discussion has taken place so far in Lao PDR about the balance of policy instruments best suited to reach environmental objectives. In general, the preference and instinct has been for command and control but the importance of economic and

related (e.g. tenurial) incentives in managing natural resources is now appreciated. The land allocation program discussed in Part II is an example of that appreciation. Provision of certain goods and services (e.g. waste disposal or water) contained an important element of cost recovery.

3.6.2 Enforcement

208. Enforcement in general is difficult in Laos. Its cost is high not only because some of the principal environmental concerns (such as shifting cultivation) are inherently difficult to control in a sparsely populated and topographically demanding country such as Laos. It is made higher also by the need for sensitive handling of problems that have an ethnic dimension. Among other obstacles to efficient enforcement are the elements of inconsistency in regulatory provisions mentioned earlier on as well the more traditional problem of insufficient funding.

209. In enforcing its EIA regulations, STEA has adopted by now a standard approach: In consultation with other agencies, it reviews the IEE (Initial Environmental Examination) and determines whether to issue an environmental compliance certificate, or to require an EIA. STEA is responsible for reviewing and approving EIA reports, and coordinates the review with relevant line ministries and other government agencies. The number of IEE and EIA reviewed by STEA is given in Table 33 below.

Table 3.5: IEE and EIAs reviewed by STEA, 2004

No.	Names of projects and factories	Certificates for	Year
1	115 Kv transmission Line from Thakhek to Sepon Gold mine	Approval of Initial Environmental Examination (IEE) report	2004
2	115 Kv transmission Line from Pakse to district	Approval of Initial Environmental Examination (IEE) report	2004
3	R3 Road construction project Approval of Environmental Impact	Assessment (EIA) report	2004
4	Xekaman 3 hydropower project	Approval of Initial Environmental Examination (IEE) report	2004
5	Copper mining project in Luangnamtha province	Approval of Initial Environmental Examination (IEE) report	2004
6	ADB 10 Road Construction project	Approval of Initial Environmental Examination (IEE) report	2004
7	Saikhong concrete company	Approval of Initial Environmental Examination (IEE) report	2004
8	First Pacific mining project	Approval of Initial Environmental Examination (IEE) report	2004
9	Sepon Copper mining project	Approval of Environmental and social Impact Assessment (ESIA) report	2004
10	Vientiane cement factory	Approval of Initial Environmental Examination (IEE) report	
Source: Environmental Newsletters, 2004			

210. The responsibility for monitoring compliance with environmental standards rests with STEA's Environmental Research Institute (ERI) established in 1999. Within ERI, the Environmental Quality Monitoring Center (EQMC) is tasked with collecting necessary data but to

date, little information exists. Even today, EQMC's activity therefore exists largely on paper and it had no impact on environmental performance during the period reviewed here.

3.6.3 Environment and Civil Society

211. The concept of civil society in the sense of uncoerced collective action as opposed to the structures of the state is not well understood in Lao PDR where the Communist Party represents all society, civil or otherwise. That does not mean that elements of civil society are altogether absent. International and local NGOs have operated in Laos for a long time and some have seen their role as much more than gaining access to development aid. Among encouraging examples of NGOs' role in the environmental domain is the Sustainable Agriculture Forum (SAF), an autonomous coalition of international non-government organizations (NGOs) and Lao development workers who are promoting sustainable agriculture, community forestry and other environmentally sound and participatory approaches to rural development in Lao. SAF was founded in March 1991 by a group of Lao development workers employed by international NGOs who had programs in rural development in the country. SAF is affiliated with the South East Asian Sustainable Agriculture Network (SEASAN), and is informally connected to several other regional networks. Most of forest-related activities supported and implemented by NGOs have been coordinated by SAF staff. Similarly, with CUSO and Canada Fund support, the Department of Forestry introduced participatory rural appraisal (PRA) techniques for collecting information on existing community-based models of forest management throughout the country. Currently there are close to two dozens international NGOs with their local partners active in various aspects of natural resource management in Lao PDR.

212. More recently, international and local NGOs have been actively involved in the discussion about the environmental impacts of the Theun Hinboum and Nam Theun 2 hydropower projects. Although at times heated (especially on the international NGO side), the discussions has had the result of forcing the project proponents to ensure high quality of environmental safeguards built into the projects.

3.6.4 Environment, Health & Safety

213. In general, there have been major improvements in Lao population's health status in the last fifteen years. Average life expectancy at birth has increased from less than 50 years before 1990 to about 59 years currently. The number of health facilities has increased by 75 per cent in the last five years. In 2000, the country was declared free of polio. The incidence of other target diseases such as neonatal tetanus, measles, pertussis, and diphtheria continued to decline during the reviewed period. Mortality from malaria in rural areas declined by 60 per cent between 1996 and 2004. Access to clean water in rural areas increased from 31.8 per cent in 1995 to 56 per cent in 2004. Availability of latrines increased from 29.6 per cent in 1995 to 36.3 per cent in 2004.

214. These are encouraging trends and achievements but a lot remains to be done. First, the health status of Lao people continues to be poor by regional standards. Second, serious disparities in health indicators, access to and the quality of health services between rural and urban areas have not diminished in recent years. Even now, infant and under five mortality rates, for instance, are twice as high in rural areas as in urban areas, while maternal mortality rates are more than three times higher; in remote mountainous areas and among ethnic minorities the disparities are even more marked. Limited access, severe poverty, malnutrition,

illiteracy, non-hygienic lifestyles, low quality of services and poor availability of essential drugs are among the contributing factors.

3.6.5 Information Access and Stakeholder Participation

215. Information about many aspects of environmental managements in Laos remains seriously incomplete as the experience of preparing this EPA demonstrated. This should not come as a surprise. Information gathering and communications are expensive activities and certain types of data (e.g. on waste management in smaller communities, pattern of capture fisheries, stocks of hazardous waste and several more) are simply unavailable. The extent to which available information could be accessed during the period under review varied. Most official data were in principle available although there has been insufficient sharing of data both among government agencies let alone between the Government and the public, and no tradition of improving their quality (checking them, reconciling conflicting information, seeking clarifications, summarizing information in a user-friendly way, etc.). The accessibility was typically a matter of funding, donor-funded projects usually producing information for a wider audience.

216. The spirit and provision of Aarhus Convention are not well known in Lao PDR to this day and have played no role until now. UN Agencies active in Laos are well aware of the need to provide information to the public and have been active in this domain.

217. The Environmental Management Strategy is formulated as a result of extensive coordination with various sectors concerned at both central and local levels. Its preparation has involved a long-lasting consultation process conducted at National and Provincial levels. The process of the implementation of this Strategy will more likely be achieved, provided there is participation and support from all stakeholders, including external and international organizations and most importantly, the active contribution of the people of Lao PDR. (NSE, 2004)

3.7 Environmental Awareness and Education

3.7.1 Environmental Awareness

218. Since 1994 Provincial Science Technology and Environment Offices (PSTEOs), in cooperation with NGOs and Mass Organizations, Lao Woman Union (LWU) and Lao Youth Organization (LYO), implemented programs to increase public awareness across the entire country on issues like health, environmental education, and poverty reduction. The Government continued to promote special environmental days, which include Tree Planting Day, Fish Release Day, World Population Day, World Water Day, and World Environment Day. The impact of these programs on actual outcomes is uncertain.

3.7.2 Environmental Education

219. The Government's efforts to promote environmental education at the primary and secondary school levels and development of necessary teaching manuals, course books, posters and leaflets provided to both teachers and students go back only five years. There is

every reason to expect their impact to be strongly positive in the long run but the effect on actual performance during the period of assessment was probably insignificant.

220. The National University of Lao PDR (NUoL) launched the first ever five-year B.Sc. Program in Environmental Science and Management in September 2004. Additionally, the Faculty of Forestry designed a model curriculum called "forestry and the environment". The module includes three main topics: income generation and forestry; forestry management, water and watershed management; and soil use. The Faculty of Economics at NUoL has also incorporated an environmental economics course into the Faculty's Economics Program. Here, too, the development is too recent to have had any impact on past environmental performance.

IV CONCLUSIONS AND RECOMMENDATIONS

221. The 1990s, and especially the last decade, were a period of intense environmental policy and strategy development in the Lao PDR. This reflected in part a greater openness of the country to the outside world and the resulting need to align the country's institutions and policies with those of the outside worlds, especially those of the donor community. There is little doubt about the volume of work accomplished.

222. The actual environmental management performance of the Lao PDR was, perhaps not surprisingly, mixed. First, the policy and institution-forming developments ran well ahead of the local ability to implement the policy and institutional agenda. Second, expectations were raised. More concerns were articulated and gradually, there was a greater willingness to quantify policy objectives. A more demanding policy makes targets more difficult to attain. Below we draw conclusions and make a number of recommendations. The recommendations are divided into those that deal with the quality of the environmental assessment and those that address the performance itself under the chosen environmental concerns.

4.1 Forest Resources

223. Forest resources continued to dominate the environmental agenda. Some reduction of the pressure on the country' forest resources was achieved in the last five years or so through reduction of the area under shifting cultivation. This notwithstanding, the composition of Lao forests has changed substantially in the course of the last three decades with logged-over or partly degraded forest now covering greater area than the largely undisturbed forest.

Recommendations for Future EPAs

1) Lao PDR should work with other GMS to improve the comparability of information regarding the area and quality of forest cover. At present the data are not comparable.
2) The reasons for, and advantages of, chosen definitions of "current" and "potential" forest need to be better understood.

Other Recommendations

3) The category of "potential forest" now occupies close to half of the total area of the country. It is likely that changes in the conditions of this category of land have a major bearing on the function of many of the country's watersheds. More needs to be known about this forest beyond the overall area. A policy for managing these lands needs to be articulated and targets for their management set.

4) The Government should consider creating a system of National Production Forest Areas (NPFA) based on agreements with local communities and incorporating benefit-sharing arrangements that would make it possible to use forest revenues for local development.

5) The land allocation program has made an encouraging start. However, effective utilization of allocated land is held back not only by lack of capital, labor or technical knowledge by the new tenants but also by weaknesses in the very process of land allocation. Local offices in charge of land and forest allocation should receive better equipment and technical skills necessary for the proper implementation of the land allocation program.

4.2 Water Resources

224. Lao PDR possesses a great wealth in its water resources. Water resources in Lao PDR do not appear to be seriously polluted but better monitoring of their status is needed. A number of preconditions need to be fulfilled to make this possible.

Recommendations for Future EPA's

1) Future EPAs need to go well beyond assessment of drinking water access and look at the hydrological functioning of key watersheds and water availability for the country's growing agriculture. A separate set of indicators needs to be developed for this such as water run-off and its seasonal profile or irrigation water storage capacity.

2) The reliability of the figure of access to safe drinking water in rural areas should be confirmed for future EPAs.

3) Future EPAs should provide information on the functioning of the water supply systems in smaller urban settlements that received assistance in the past for basic piped water systems with public stand posts, shallow wells or boreholes.

Other recommendations

4) The Government's generalized support for efficient management of water resources needs to be converted into improved practices of integrated watershed management.

5) More work needs to be done on the development of water quality standards and the legal framework for controlling water quality.

4.3 Fish Resources

225. Over the last two decades, aquaculture development has gone a long way in Lao PDR, from virtually no fish breeding before 1975, to breeding over 15 species now, development of cage culture and peri-urban semi-intensive aquaculture by small private entrepreneurs besides the state farms. The development of aquaculture has removed some pressure off capture fishery resources but better monitoring of the existing patters of output and prices is needed.

Recommendations for Future EPA's

1) The unreliability of the fish production statistics makes it difficult to adequately judge the threat of depletion of some fish species in the Lao portion of the Mekong Basin. The anomalies in the reported production data should be explained and the statistical process of collecting fisheries-related data reviewed.

2) The potential threat of capture fisheries deserves to be monitored through better indicators than the one used in this EPA. Lao authorities need to work more closely with the Mekong River Commission to develop such indicators and in general, make a much better use of the information and know-how that exists at MRC.

3) A study of the pattern of demand for fish in Lao PDR might help the authorities better judge the potential usefulness of fish prices as an indicator of the state of the fish resource.

Other Recommendations

4) Support to aquaculture development by various projects in the past put the emphasis on hatchery rehabilitation and/or construction and seed production. More effort should be placed on developing and disseminating culture technologies that could be sustained under the existing socio-economic conditions. This and better extension systems are needed to improve the prospects for increased fishpond production and access to formal credit by aquaculture operation.

4.4 Threats to Biodiversity

226. Lao PDR is unique in GMS in relying on biodiversity for a significant part of the Government revenue. This alone places biodiversity conservation to the forefront of Government preoccupations.

227. The potential to develop ecotourism activities linked to biodiversity conservation in PAs and areas of high ecological significance remains largely unrealized. An opportunity still exists to establish programs that focus on linking ecotourism to biodiversity conservation from the onset.

Recommendations for Future EPA's

1) The large area of plantation forest in Lao PDR, some of it two decades old, suggests that a review of its impact on biodiversity of plantation establishment ought to be undertaken. Based on such a review, the indicators of pressure or response may need to be adjusted by the time of the next EPA.

2) Existing GIS and other data are not organized in a way that makes it possible to evaluate the degree of the Government's success in protecting different classes of habitats. Steps should be taken to make this possible.

Other Recommendations

3) The potential to develop ecotourism activities linked to biodiversity conservation in PAs and areas of high ecological significance remains largely unrealized. An opportunity still exists to establish programs that focus on linking ecotourism to biodiversity conservation from the onset. At the macro level, the NTA, DFRC, STEA and the Ministry of Information and Culture should collaborate to form a cohesive ecotourism policy and work together to strengthen regulatory framework and guidelines that support ecotourism's role in biodiversity and cultural conservation.

4.5 Land Degradation

228. Despite the recent slowing down in its expansion, shifting cultivation in Laos remains a serious cause of forest and environment destruction. Population growth and poverty add to the problem due to the limitation of arable land for permanent agriculture which is also considered as a major cause of land degradation.

Recommendations for Future EPA's

1) Better consideration and analysis of sedimentation data, preferably undertaken in consultation with MRC, are needed to establish whether such data are well suited to be a proxy for the state of land resources.
2) Develop new indicators to assess the effectiveness of the Government's sedentarization programs.

4.6 Inadequate Solid Waste Management

229. The generation of solid waste in expanding urban areas in Lao PDR is on the rise posing the usual range of problems associated with incomplete collection and incomplete or discriminate disposal.

Recommendations for Future EPA's

1) Our knowledge of the solid waste management in smaller towns of Laos is patchy. Minimum reporting requirements should apply to such towns to make it possible to judge the possible seriousness of the situation outside the four of Lao PDR's principal towns.

Other Recommendations

2) The structure of the Government's environmental funding should be reviewed and the almost total reliance on donor funding for improved solid waste management should be accompanied by greater allocation from government budget especially to improve waste management in smaller towns and settlements until now largely neglected.

4.7 Inadequate Hazardous Waste Management

230. The knowledge of the Lao authorities of the use and disposal of hazardous waste remains inadequate. The starting step should be a better database.

Recommendations for Future EPA's

1) Evaluate the results of the 2004 pilot inventory of hazardous substances in Lao PDR and based on that evaluation, prepare a plan of action for improved data gathering and monitoring of hazardous waste.
2) Confirm the figures of hazardous waste imports and explain the dramatic drop in Lao PDR's imports of such substances in the 1990s.

Other Recommendations:

3) Ensure that activities relating to hazardous substances management are combined with work undertaken in Lao PDR under the Stockholm ("POPs") Convention in order to avoid duplication.

4.8 Climate Change

231. The climate change debate continues to be far removed from the daily concerns of ordinary Laotians. Yet, because of its large forest cover and the special pattern of deforestation, Lao PDR's reporting to UNFCCC is of considerable interest. With the pattern of emissions dominated by what is happening to the forest it is particularly important to pay greater attention to the quality of the forest-related estimates of GHG emissions.

Recommendations for Future EPA's

1) An updated estimates should be commissioned by STEA, for financing by the donor community, of the volume of GHG emissions with particular attention to the methodology of estimating the emissions associated with forest burning and forest decay.

4.9 Cross-cutting Recommendations

1) Government should consider combining own funding with donor funding in building on recent advances in capacity building under ADB and SIDA support. The efforts should primarily target (a) shortfall of environmental personnel needed in the country; (b) the scale of on-the-job training programs undertaken for national and provincial staff (b) the contractual and employment, conditions of the trained personnel (c) STEA's technical skills in environmental assessment (e.g., in IT, GIS, database management, techniques of pollution monitoring); (d) the capacity of MAF's offices in the provinces and districts to undertake monitoring, patrolling and enforcement tasks.
2) Additional attention should be given to improving cross-sectoral coordination among CPI, MCTPC, MIH, MAF and STEA.
3) A fresh look should be taken at the size and structure of government environmental budget with the view of bringing relative budget contribution closer to that found among Lao PDR's GMS neighbors. .Strengthening the enforcement capacity of STEA, MAF and other relevant ministries and provincial agencies should have the first priority on possible increases in environmental funding.
4) A program of boosting environmental education 2006-2010 should be formulated by STEA consisting of (a) encouraging the NUoL to double, by 2010, its intake of students of environmental and related disciplines (b) corresponding strengthening of the curriculum, teaching materials and related infrastructure; (c) support to vocational schools to introduce short-term diploma programs in different environment topics.
5) The STEA should formulate and implement a program of raising the awareness of priority environmental issues through village awareness programs administered by mass organizations.

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