



Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

**NATIONAL BIODIVERSITY STRATEGY TO 2020
AND ACTION PLAN TO 2010**

Executive Summary

Internationally, the Lao PDR is party to a number of multilateral agreements that are relevant to the conservation and sustainable use of biological resources. The Convention on Biological Diversity is global in scope. It covers the full range of biodiversity and aims primarily at the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits generated from the use of genetic resources

At national level, major initiatives include the National Environmental Strategy, the Forest Sector Strategy (under preparation), the Agriculture Sector Strategy and the Decree 164 to establish the nation's Protected Area System. Further, achieving the goals set by the Socio-Economic Development Vision and the National Poverty Eradication Programme will be rather difficult without a stabilised environment and sustainable utilisation of natural resources.

The Government of the Lao PDR acceded the **International Convention on Biological Diversity (CBD)** – in 1996 and committed itself as part of its obligations as party (signatory), to developing a national biodiversity strategy. The Lao PDR's National Biodiversity Strategy and Action Plan (NBSAP) aims to protect biodiversity resources and to ensure their sustainable use.

Biodiversity is the variety of all life forms – the different plants, animals and microorganisms, the genes they contain, and the ecosystem of which they form a part. Biological diversity is never static, yet constantly altering. Biodiversity emphasises the interrelatedness of the biological world and covers therefore terrestrial and aquatic environments.

The Lao PDR is rather rich in biodiversity. There are an estimated 8 – 11,000 species of flowering plants. Lao fauna comprises reported 166 species of reptiles and amphibians, 700 species of birds (another 100 are reasonably likely to occur), 90 known species of bats and over 100 species of large mammals. In the Indochinese Peninsula, despite limited surveys, 87 families of fish have been identified in comparison to 74 families in the whole of Africa and only 60 in South America. About 500 indigenous fish species are reported to live in the Mekong and its tributaries in Lao PDR. The centre of origin of the glutinous rice types is recognised to be within Lao PDR and northern Thailand.

Human activity has been changing Lao's ecosystem for a long time. Modification and conversion of natural ecosystems, overexploitation of biological resources and destructive harvesting techniques, and knock-on effects or externalities from other production processes are main contributors to the changes in distribution and abundance.

The NBSAP comes at a time, when the Government of the Lao PDR works towards poverty eradication and

sustainable development. In the given context of Lao, sustainable use of natural resources – and in particular the country's rich biodiversity – may hold one key to reducing poverty. The country's economy also depends mainly on natural resources. Maintaining the productivity of these important resources constitutes the true value of biodiversity and remains central to any national development strategy.

Maintaining and conserving biodiversity stands for much more than just protecting wildlife and their habitats in specifically designated areas; it provides several benefits. Biodiversity is the primary source for the fulfilment of basic needs and provides a basis for adaptation to changing environments. An environment rich in biodiversity offers to the people of Lao the widest range of options for sustainable economic activity, for human welfare and for adaptation to change.

Biodiversity makes a major contribution to national economic activity and growth, contributes to government revenues. Biodiversity forms an integral part of rural livelihoods and poverty alleviation and plays an important role in supporting urban and commercial production and consumption in key sectors of the economy. Biodiversity conservation supports a wide range of economic activities and uses, including irrigated agriculture, medium and large-scale hydropower, fishponds and aquaculture and urban water supply.

Benefits arising from the conservation of the nation's biodiversity are not restricted to the sustained harvest of resources. Biodiversity provides crucial ecological services through basic activities such as pollination, seed dispersal and pest control. This is true of all types of creatures: mammals, birds, fish, reptiles, amphibians and especially invertebrates (such as insects, and spiders, etc). Both wildlife, especially invertebrates, and plants, together with bacteria and fungus carry out the critical daily (hourly) functions of waste disposal and nutrient recycling which are the building blocks of the food chains that sustain the web of life. The maintenance of hydrological cycles, climate regulation, soil productivity, nutrient recycling and pollutant breakdown are other, important services. They are undervalued; but they are fundamental for our quality of life and our economy.

Another benefit of conservation is avoidance of costs incurred through degradation of ecological systems. Biodiversity conservation and catchment protection e.g. helps to avoid downstream damage costs arising from increased incidence of flooding and dry-season water supplies. Redressing environmental degradation can be prohibitively expensive.

Biological diversity is important for cultural identity throughout the country. The Lao PDR is a multi ethnic society with a cultural diversity unparalleled in the region. The groups' social systems, cultural characteristics and identity are linked to their language, geographical area and surrounding ecosystem, their interaction with this physical environment (e.g. forests, rice fields, wetlands or rivers), and their access to material goods.

To date, in the Lao PDR as in many other countries, there has been little appreciation of the importance of biodiversity in economic terms, and conservation has often been seen as an uneconomic or unproductive use of land, funds and other resources.

Universities, scientific and other research organisations will have to play an enhanced role in extending our knowledge and understanding of biological diversity. The loss of biodiversity cannot be slowed unless the underlying causes are understood and directly addressed.

The NBSAP covers terrestrial and aquatic biodiversity and concentrates on the conservation of indigenous biodiversity. The NBSAP provides the bridge to connect current efforts and the effective identification, conservation and sustainable management of the country's rich biodiversity and the framework for cooperative protection of Lao's biological diversity, within the context of sustained development and poverty eradication.

The Goal of the National Biodiversity Strategy and Action is:

Maintain the diverse biodiversity as one key to poverty alleviation and protect the current asset base of the poor

Main Objectives:

1. Identify important biological diversity components and improve the knowledge base
2. Manage biodiversity on regional basis, using natural boundaries to facilitate the integration of conservation and utilization oriented management
3. Plan and implement a biodiversity specific human resource management program
4. Increase public awareness of and encourage participation in sustainable management of biodiversity
5. Adjust national legislation and regulations and harmonise them MEAs
6. Secure the NBSAP implementation
7. Promote country needs driven international cooperation

Implementing the NBSAP requires cooperation and coordination from all levels of government and the Lao society. In addition, public awareness, education and community involvement are critical elements for the conservation biological diversity. The knowledge and experience of local and indigenous people must be taken into consideration and fully used. Awareness needs to be extended to stimulate the sense of community involvement and ownership.

All sectors of the Lao PDR will share the costs and benefits of conserving biological diversity. Costs include the establishment and implementation of PAs and specific conservation programmes, and the cost of opportunities foregone. On the other hand, significant economic benefits are to be gained from acting now, namely future opportunities for sustained resource use and considerable future savings in the cost of rehabilitating species and ecosystems.

The Lao PDR's Government accepts the responsibility for protecting the nation's biological diversity for the benefit and welfare of the population now and in the future. Objectives listed in the NBSAP will require time to be achieved; the necessary actions will be implemented within the country's economic and budgetary constraints. The GoL recognises the need for a strong cooperation with international partners in order to bring about the objectives introduced in the NBSAP.



LAO PEOPLE'S DEMOCRATIC REPUBLIC
Peace Independence Democracy Unity Prosperity
-----000-----

Prime Minister's Office

No. 84 / PM
Vientiane, 11 June 2004

Decree
On agreement and Endorsement of
the National Biodiversity Strategy to 2020
and Action Plan to 2010

- Pursuant to the Law on the Government of Lao People's Democratic Republic, No 01/95 Dated 06 May 2003.
- Referring to the Proposal of the Science Technology and Environment Agency, No 0832/STEA-PMO, dated 06 May 2004.

The Prime Minister's Issue Decree

- Article 1: To endorse and declare the National Biodiversity strategy to 2020 and Action Plan to 2010 as the Minister to the Prime Minister's Office, President of the Science Technology and Environment Agency dated 3 June 2004.
- Article 2: To authorize the STEA to collaborate effectively with the concerned line-Ministries for implementation of this strategy and action plan.
- Article 3: To instruct concerned ministries, ministerial equivalent agencies, provinces, Vientiane capital city, special zone and other sectors to implement this decree strictly.
- Article 4: To inform that this decree will enter into force from the date it is signed. All regulations and rules that are abrogated.

Prime Minister

Signed and Seal
Boungnang VORACHIT

TABLE OF CONTENTS

1	Introduction	1
2	Guiding Principles	5
3	Biodiversity Strategy to 2020	8
4	The Biodiversity Action Plan To 2010	11
4.1	Overall Goal	13
4.2	Main Objectives	13
4.3	Programmes	13
5	Implementing Measures	23
5.1	Institutional Arrangements	25
5.2	Target Groups	25
5.3	Funding Sources	25
5.4	Monitoring and Evaluation	25
	References	26

The Government of the Lao PDR (GoL) acceded the International Convention on Biological Diversity (CBD) in 1996 and committed itself as part of its obligations as a signatory to developing a national biodiversity strategy. The Environmental Protection Law of the Lao PDR has defined Biological diversity as being the multiplicity of ecosystems, species and classes of living organisms such as plants, animals, insects and micro-organisms which inhabit any part of nature. The National Biodiversity Strategy and Action Plan (NBSAP) is the principal output of the Project on NBSAP, which has been implemented and jointly managed by the Science Technology and Environment Agency (STEA) and the Ministry of Agriculture and Forestry (MAF) with support from the United Nations Development Programme (UNDP). The Danish Government financed the project through a grant, which was supplemented by funds made available from the UNDP. National strategies aim to protect biodiversity resources and to ensure their sustainable use.

The NBSAP comes at a time, when the GoL is working towards poverty eradication and sustainable development. In the given context of the Lao PDR, the sustainable use of natural resources – and in particular the country's rich biodiversity – may be the key to poverty reduction. The country's economy also depends mainly on natural resources. Hydropower, non-timber forest products (NTFPs), and wood products are important exports, thus contributing to the country's hard-currency income. Eco-tourism as a new branch of the Lao PDR's tourism industry markets the relatively undisturbed nature of the country. Estimates suggest that biological diversity is the main source of wealth for the country, and maintaining the productivity of these important resources constitutes the true value of biodiversity and remains central to any national development strategy.

The Lao PDR has a rather rich biodiversity and scientific assessments of Indochina's biodiversity have concluded that the country is a globally important region. There are an estimated 8 – 11,000 species of flowering plants. Lao fauna comprises of 166 reported species of reptiles and amphibians, 700 species of birds (another 100 are reasonably likely to occur), 90 known species of bats and over 100 species of large mammals. In the Indochinese Peninsula, despite limited surveys, 87 families of fish have been identified in comparison to 74 families in the whole of Africa and only 60 in South America. About 500 indigenous fish species are reported to live in the Mekong River and its tributaries within the borders of the Lao PDR. The centre of origin of the glutinous rice types is recognised to be within the country.

Human activity has been changing the Lao PDR's ecosystem for a long period of time. Modification or conversions of natural ecosystems, overexploitation of biological resources and destructive harvesting techniques, as well as knock-on effects or externalities from other production processes are the main contributors to the changes in distribution and abundance.

Maintaining biodiversity means much more than just protecting wildlife and their habitats in specifically designated areas. In the Lao PDR it also concerns the livelihood of the majority of the population, the basis for sustained economic development and therefore the sustainable use of the nation's biological resources. The sustainable management of the Lao PDR's terrestrial and aquatic environments is essential to ensure the sustainable use and conservation of biodiversity.

Conserving biological diversity provides several benefits. Biodiversity is the primary source for the fulfilment of the population's basic needs and provides a basis for the adaptation to changing environments. An environment rich in biodiversity offers the people of the Lao PDR the widest range of options for sustainable economic activity, for human welfare and to adapt to change.

To date there has been little appreciation of the importance of biodiversity in economic terms, and conservation has often been seen as an uneconomic or unproductive use of land, funds and other resources. Analysis however shows that there are significant and wide-ranging economic benefits associated with the conservation of the Lao PDR's biodiversity.

Biodiversity makes a major contribution to national economic activity and growth, and contributes to government revenues. Biodiversity forms an integral part of rural livelihoods and therefore is instrumental achieving poverty alleviation and it also plays an important role in supporting urban and commercial production as well as consumption in key sectors of the economy. Biodiversity conservation supports a wide range of economic activities and uses, including irrigated agriculture, medium and large-scale hydropower, fishponds and aquaculture and an urban water supply.

Benefits arising from the conservation of the nation's biodiversity are not restricted to the sustained harvest of resources. Biodiversity provides crucial ecological services through basic activities such as pollination, seed dispersal and pest control. This is true of all types of creatures whether mammals, birds, fish, reptiles, amphibians or especially invertebrates. Wildlife (particularly invertebrates such as insects and spiders) and plants, together with bacteria and fungus carry out the critical daily (hourly) functions of

waste disposal and nutrient recycling, which are the building blocks of the food chains that sustain the web of life.

Another benefit of conservation is the avoidance of costs incurred through the degradation of ecological systems. Biodiversity conservation and catchment protection for example help to avoid downstream damage costs arising from the increased incidence of flooding and maintain dry season water supplies. Redressing environmental degradation can be excessively expensive.

Biological diversity is also important for the population's cultural identity throughout the country. The Lao PDR is a multi ethnic society with a cultural diversity unparalleled in the region. The groups' social systems, cultural characteristics and identity are linked to their language, geographical area and surrounding ecosystem, their interaction with this physical environment (e.g. forests, rice fields, wetlands or rivers), and their access to material goods.

At a national level, major initiatives include the National Environmental Strategy, the Forest Sector Strategy (currently being drafted), the Agriculture Sector Strategy and Decree 164, which established the nation's Protected Area System. It should also be noted that an achievement of the goals set by the Socio-economic Development Vision and the National Poverty Eradication Programme will be rather difficult without a stabilised environment and sustainable utilisation of natural resources. This means nothing less than

enhancing present individual and community welfare by following a path of economic development that safeguards the well-being and welfare of generations to come; provides equity within and between generations; protects the integrity of biological diversity and maintains the essential ecological processes and systems which provide life-supporting goods and services.

The Lao PDR needs to bridge the gap between current efforts and the effective identification, conservation and sustainable management of the country's rich biodiversity. Implementing the NBSAP requires cooperation and coordination from all levels of government and within Lao society. In addition, public awareness through education and community involvement are crucial elements for the conservation biological diversity. The knowledge and experience of local and indigenous people must be taken into consideration and fully utilised. Awareness needs to be extended to encourage the sense of community involvement and ownership.

All relevant public and private sectors will need to co-operate in development planning and implementation. This will be essential due to the manifold co-ordination of both internal and international partners, which is required to ensure the effective implementation of the NBSAP and the achievement of its objectives.

Generally, the principles underlying the NBSAP are based on the Government of the Lao PDR direction for the nation's sustainable socio-economic development, the expressed and felt needs of the Lao people as well as on international principles.

The following principles have been adopted as the basis for the NBSAP's objectives and actions. Implementation should follow these guiding principles:

1. Biodiversity is a national heritage and must presently be used in a sustainable manner and be conserved and protected for future generations.
2. The NBSAP must be fully consistent with the Socio-economic Development Strategy up to the years 2010 and 2020 and with efforts to attract foreign investment.
3. The NBSAP must be based on an analysis of the present status of the environment, but must also take into account the emerging trends of industrialization and modernization.
4. The national development process must reflect ecological, economic, social, cultural and spiritual values of the local people.
5. The sustainable use of biodiversity is a key element of livelihood strategies.
6. The knowledge, innovations and practices of local people should be respected and their use and maintenance of biodiversity carried out with the support and involvement of their people.
7. Biodiversity is best conserved in-situ.
8. The conservation and sustainable use of biodiversity resources require co-operation at all levels, namely local, national, regional and global and also a sharing of knowledge, costs and benefits.
9. The NBSAP should address biodiversity depletion, improve the data and information status and provide a link between biodiversity and economic development.
10. The formulation and implementation of policies and the establishment of a legal framework are necessary as effective measures against biodiversity depletion.
11. Education and the raising of public awareness are essential in ensuring the conservation and sustainable use of biodiversity resources.
12. The integration of conservation and development is one form of sustainable PA management.

In order to support the long-term development objectives set by the Socio-economic Development Vision, especially the National Environment Strategy and National Poverty Eradication Programme as well as to ensure the environmental protection, conservation and sustainable use of biodiversity the NBSAP addresses the following issues in its strategy to 2020:

- The sustainable utilisation of natural resources as well as the protection and conservation of the environment in order to ensure the sustainable development of the country, the reduction of poverty and the enhancement of the quality of life and health of all the people in the Lao PDR.
- Cultivated areas should remain diverse and productivity should be increased, through protection, conservation and the sustainable use of land resources.
- The forests of the Lao PDR should remain rich and productive, through sustainable and productive management, and where necessary through conservation and protection.
- The rich biodiversity of the Lao PDR should be maintained, through the protection, the conservation and the sustainable utilisation of biodiversity resources, including wild, semi-domesticated and domesticated biodiversity.
- Water resources such as ground water, lakes, rivers, streams and wetlands should remain clean and abundant, and where necessary, be improved, through their protection, conservation and sustainable use.
- Human settlements, including urban areas as well as cultural and historical heritage sites should be protected and improved.
- The air should remain clean and the Lao PDR should contribute towards the protection of the earth's atmosphere by limiting air pollution, ensuring that no contributions are made towards climatic change and by assisting in the maintenance of the protective ozone layer.
- The safeguarding of user rights and the equitable sharing of benefits amongst Lao people through the utilisation of national biodiversity resources.
- The improvement and development of laws and regulations; and securing their effective enforcement.

4.1 Overall Goal

The overall goal of the National Biodiversity Strategy and Action Plan to 2020 is to:

Maintain the country's diverse biodiversity as one key to poverty alleviation and protect the current asset base of the poor as support to the implementation of the government's priority programmes.

4.2 Main Objectives

1. Improve biodiversity data and fill data gaps through basic and applied research.
2. Improve biodiversity management and monitoring.
3. Plan and implement a biodiversity specific human resource development programme.
4. Increase public awareness of and encourage participation in the sustainable management of biodiversity.
5. Adjust national legislation and regulations related to biodiversity and harmonise them with Multilateral Environmental Agreements (MEAs).
6. Secure the NBSAP's implementation.
7. Promote country needs driven international cooperation.

4.3 Programmes

In order to achieve the goal and objectives of the Strategy and Action Plan to 2010, it is necessary to define and implement the following 7 programmes:

1. Scientific Data and Biodiversity Knowledge Development
2. Biodiversity Management
3. Human Resource Development
4. Public Awareness and Involvement
5. Institutional and Legal Frameworks
6. NBSAP Implementation
7. International Cooperation

Details of the goals, objectives and actions are outlined in the table below:

Programme 1: Scientific Data and Biodiversity Knowledge Development		
Goal	Biodiversity data is improved and data gaps are filled through basic and applied research.	Action 2010
Obj 1:	Identify important biological diversity components and improve the knowledge base.	<ol style="list-style-type: none"> 1 Assess data gaps and research needs. 2 Develop a five-year research programme. 3 Co-operate with international institutions. 4 Upgrade research methodologies to international standards. 5 Identify all relevant habitats and ecosystems in the Lao PDR and identify rare and/or threatened species. 6 Improve knowledge on taxonomy and the status of biodiversity and data information management. 7 Accelerate research into the taxonomy, geographic distribution of the nation's terrestrial and aquatic plants, animals and micro-organisms with priority on lesser known groups. 8 Establish field research stations in areas where this is possible. 9 Identify biodiversity components that are important for conservation and sustainable use. 10 Identify biodiversity components which are inadequately understood. 11 Identify terrestrial and aquatic components of biodiversity that are important for conservation and sustainable use and those requiring an urgent need to be known.
Obj: 2	Recognise and ensure the contribution of the ethno biological knowledge of Lao PDR's local and indigenous peoples in the conservation of biodiversity.	<ol style="list-style-type: none"> 1 Promote the participation of local and indigenous people in research programmes and the management of their resources. 2 Ensure the equitable sharing of the benefits which may arise from the use of knowledge and practices. 3 Assess the potential of the knowledge and practices of local people for nutritional and medical uses, as well as for wildlife and PA management. 4 Acknowledge the value of knowledge and practices of indigenous people and local communities. 5 Encourage the recording of knowledge and practices with the approval and involvement of the indigenous people and local communities concerned.
Obj: 3	Ensure the provision of knowledge, information and understanding of the nation's biodiversity which is required for its effective utilisation, conservation and management.	<ol style="list-style-type: none"> 1 Exchange and share information on NBCAs at both regional and international levels. 2 Compile existing species names in Lao and work towards forming a set of Lao names usable in legal terminology and other circumstances. 3 Design effective interpretative materials for legal documents naming wildlife species. 4 Establish a National Biodiversity Information Centre. 5 Provide regular information on the true status of biodiversity. 6 Develop in close cooperation with major stakeholders mechanisms for the improvement of research and co-ordination for safeguarding intellectual property rights. 7 Ensure that all information generated on the nation's biodiversity is published and disseminated (computer networks included) so as to safeguard intellectual property rights.

Programme 2: Biodiversity Management	
Goal	Action 2010
Obj: 1 Establish and manage a comprehensive and representative system of PAs that covers the nation's biodiversity.	<ul style="list-style-type: none"> 1 Review the existing NBCA network and management system. 2 Identify and determine ecosystems zoning. 3 Designate, protect, and manage habitat corridors linking PAs.
Obj: 2 Improve the standards of management and protection of the nation's biodiversity.	<ul style="list-style-type: none"> 1 Improve the institutional and legal basis for PA management. 2 Integrate the NBCA management plan into cross sector planning at the provincial level. 3 Establish appropriate incentives and financial mechanisms for NBCA management. 4 Provide sufficient funds for effective NBCA management. 5 Ensure that people living in and around NBCAs participate actively in their management. 6 Strengthen the NBCAs' management capacity. 7 Promote participation in NBCA management. 8 Implement ICAD objectives. 9 Integrate the traditional knowledge of local and indigenous people in biodiversity management. 10 Introduce year-round bans on hunting and harvesting in substantial core areas within NBCAs.
Obj: 3 Conserve threatened and endangered species by enabling the species to survive in their natural habitats.	<ul style="list-style-type: none"> 1 Re-survey and reclassify threatened and endangered species. 2 Compile a national Red List of declining wildlife species. 3 Adopt international classification for vulnerable and endangered species. 4 Formulate guidelines to ensure long-term conservation of all species of mammals, birds, reptiles and amphibians. 5 Limit the illegal hunting of and trade in wildlife resources. 6 Develop and apply mechanisms to enable the identification of vulnerable species. 7 Enhance wildlife resources conservation efforts through Flagship species. 8 Implement standing protection legislation. 9 Identify key species for specific management. 10 Develop and implement specific recovery plans for vulnerable species. 11 Concentrate on the species listed as subject to management controls. 12 Introduce accepted wildlife and plant management principles to national management concepts.
Obj: 4 Establish and maintain ex-situ research and conservation facilities.	<ul style="list-style-type: none"> 1 Regulate and manage the collection of biological resources from natural habitats to ensure that ecosystems and the in-situ population are not disturbed. 2 Control and manage the use of ex-situ biodiversity effectively. 3 Promote research on ex-situ conservation. 4 Integrate ex-situ measures through research and develop appropriate approaches for the recovery, rehabilitation and reintroduction of endangered species to their natural habitats. 5 Establish a National Natural History Museum. 6 Develop an open zoo/botanical garden.

<p>Obj: 5 Ensure that the social and economic benefits from the use of genetic material and products originating in the Lao PDR accrue to the nation.</p>	<ol style="list-style-type: none"> 1 Draft and enact legislation on access and benefit sharing for genetic resources originating in the Lao PDR. 2 Establish national rules for the protection and use of traditional knowledge. 3 Develop capacity in the field of modern biotechnology. 4 Translate international regulations into national legislation and practical policies. 5 Participate in the renegotiation of the International Undertaking (IU) of Plant Genetic Resources. 6 Encourage industrialised countries whose businesses use genetic resources to ensure that such use can only occur if the origin of the material is indicated and the benefits are shared equitably. 7 Ensure that all concerned / involved parties share the benefits of genetic resources.
<p>Obj: 6 Protect indigenous biodiversity from the uncontrolled introduction and spread of alien species and genetically modified organisms (GMOs).</p>	<ol style="list-style-type: none"> 1 Draft and enact legislation on the import and use of GMOs. 2 Develop regulations according to international obligations. 3 Establish national bodies with the power and competency to execute the functions required by the CBD (risk-assessment, precautionary principle, public participation, etc.). 4 Monitor the occurrence of alien invasive species. 5 Establish a bio safety framework. 6 Raise public awareness of the use of GMOs. 7 Establish quarantine laws. 8 Control the importation of alien invasive species. 9 Enhance capacity in the fields of risk-assessment, risk-management, and socio-economic impact assessment. 10 Develop data and information exchange mechanisms on Bio safety. 11 Translate international resolutions and regulations on bio safety into national legislation and policymaking.
<p>Obj: 7 Promote ecologically sustainable management practises for eco-tourism.</p>	<ol style="list-style-type: none"> 1 Co-ordinate, guide and regulate the sector to achieve target objectives. 2 Support both the public and private sectors to promote sustainable growth. 3 Support training, capacity building and good practice. 4 Provide socio-economic development for host communities. 5 Improve and develop regulations for eco-tourism management. 6 Strengthen the capacity across the sector as well as institutional arrangements. 7 Support environmental protection and nature conservation. 8 Develop research and information.

Obj.8	Support the conservation of biodiversity through ecologically sustainable forestry management practices.	<ol style="list-style-type: none"> 1 Delineate the forest types clearly according to the forestry law. 2 Revise and develop specific regulations. 3 Improve the management system of production forests to ensure the sustainable use of biodiversity. 4 Support forest certification and apply it to the forest production system. 5 Conduct logging with low impact and ensure its sustainability. 6 Promote tree plantation for environmental protection and commercial purposes. 7 Regulate and control the collection of NTFPs and medical plants. 8 Promote the sustainable management of NTFPs to improve rural livelihoods. 9 Enhance the local, public and private sectors' participation in the protection and utilization of forest resources. 10 Improve both the quality and quantity of staff to manage forest resources. 11 Ensure that plantations minimise their impacts on neighbouring ecosystems. 12 Ensure the sustainable supply of fuel wood. 13 Promote integrated catchment management for upstream forests outside of NBCAs. 14 Establish an information database on forest resources.
Obj.9	Promote industrial, energy and mining development by minimizing the impact on biodiversity during industrial development processes.	<ol style="list-style-type: none"> 1 Enforce EIA and social impact assessment effectively. 2 Develop and implement environmental standards and EIA regulations for mining measurement tools. 3 Encourage the private sector to integrate environmental concerns into their decision making. 4 Consolidate the national policy on energy development. 5 Promote the utilization of renewable energy. 6 Reduce the utilization of fuel wood in industrial processing. 7 Enforce relevant laws and regulations effectively. 8 Develop a strategy on mining. 9 Promote the use of the CBA as a selection instrument for investments. 10 Establish sustainable industrial processes. 11 Improve the facilities in existing industrial development zones. 12 Promote public participation in the industrial development process. 13 Promote the use of environmental friendly technologies. 14 Provide assistance to organisations within various industries. 15 Introduce the polluter pays principle. 16 Promote an industry code of conduct & environmental auditing standards. 17 Establish environmental standards for managing industrial development.

Obj: 10	Support the conservation of biodiversity through ecologically sustainable agriculture.	<ol style="list-style-type: none"> 1 Review and revise existing regulations on agro business. 2 Promote irrigation management transfer and strengthen community managed irrigation programmes. 3 Expand and strengthen the participatory land allocation and land use tenure. 4 Introduce sedentary agriculture systems for upland farmers. 5 Facilitate farmers' access to credit and markets. 6 Classify land use and agro ecological zoning. 7 Analyse further regional trade opportunities. 8 Prepare a programme for revision based on need and suitable for agricultural transition. 9 Monitor the progress of regional trading in agricultural products. 10 Prioritise research, trials and demonstrations of new plant and animal species. 11 Encourage farmers demand driven research.
Obj.11	Manage water resources for socio-economic development.	<ol style="list-style-type: none"> 1 Protect and maintain natural wetlands. 2 Establish a fund for bank erosion protection. 3 Strengthen the implementation of water resources management. 4 Assess the downstream impact of catchment deforestation. 5 Develop laws or regulations pertaining to bank protection. 6 Ban the disposal of all waste into river bodies. 7 Co-operate with neighbouring countries to solve related problems.
Obj.12	Support the conservation of biodiversity in urban areas.	<ol style="list-style-type: none"> 1 Encourage local governments to retain and improve natural ecosystems and to use indigenous species for plantings in urban areas. 2 Establish environmental standards for the control of air, noise, water, soil as well as visual pollution. 3 Promote the participation of the public and private sectors in urban environmental management. 4 Create orderly, clean and beautiful green cities. 5 Develop urbanization plans at regional, provincial, and district levels. 6 Integrate biodiversity considerations into relevant policies and strategies. 7 Encourage the retention of habitat in urban areas, and encourage people to conserve landscapes and architectural heritage in the cities.

Programme 3: Human Resource Development		
Goal	Plan and implement a biodiversity specific human resource development programme.	Action 2010
Obj: 1	Raise the awareness and capacity of government staff at all levels.	<ol style="list-style-type: none"> 1 Enhance awareness and education on the significance of the conservation and sustainable use of biodiversity resources. 2 Increase the understanding of the importance of biodiversity for poverty reduction. 3 Promote the understanding of the strong linkage between poverty and environmental management. 4 Inform and educate government staff about the principles and objectives of the CBD.
Obj: 2	Improve the research capacity of national experts in different fields related to biodiversity.	<ol style="list-style-type: none"> 1 Assess present research capacities related to biodiversity in terms of quality and quantity. 2 Promote research activities by visiting scientists on all aspects of biodiversity that prioritise on the skills transfer to Lao staff and students. 3 Build staff capacity through training and research. 4 Seek active cooperation with the international research community. 5 Improve specific scientific knowledge of staff. 6 Develop a skills-improvement programme. 7 Ensure that all field surveys are designed to transfer skills to Lao counterparts. 8 Facilitate and support the development of taxonomic training programmes. 9 Establish scientific teams.
Obj: 3	Improve the management capacity at all levels.	<ol style="list-style-type: none"> 1 Assess training needs. 2 Develop a needs oriented training programme. 3 Educate and train national, provincial and district personnel whose duties relate to species conservation and management. 4 Design and implement a specific course for NBCA managers. 5 Develop capacity building through short and long-term training by focusing on specific skills identified through the training needs assessment.

Programme 4: Public Awareness and Involvement	
Goal	Action 2010
Obj: 1 Improve public awareness and education.	<ol style="list-style-type: none"> 1 Raise the public's awareness of the importance of biodiversity in relation to poverty reduction. 2 Design and implement a communication campaign related to biodiversity. 3 Develop and promote public information and education programmes in consultation with stakeholders involved in the management of biodiversity. 4 Improve communication channels between the government and the public. 5 Produce and widely distribute field guides in Lao. 6 Co-operate with the mass media to produce, publish and broadcast programmes dealing with biodiversity issues. 7 Disseminate the principles and objectives of the CBD to the public and private sectors. 8 Encourage the participation of all stakeholders at all levels, including local and indigenous people. 9 Combine Biodiversity Status Reports with the State of Environment Report. 10 Encourage the national media in understanding and promoting biodiversity-related issues for dissemination to the general public. 11 Increase public awareness, education and training on ex-situ conservation. 12 Improve public access to environmental information. 13 Develop and implement an accessible clearing-house mechanism.
Obj: 2 Encourage and support public participation.	<ol style="list-style-type: none"> 1 Develop specific public involvement guidelines. 2 Ensure that public participation is a compulsory component in project planning and design processes. 3 Promote and develop nature-orientated groups for participants ranging from children to adults. 4 Introduce public participation as a guiding principle for all natural resource management activities. 5 Increase village involvement in research and management activities relating to NBCAs.
Obj: 3 Introduce biodiversity related studies to educational curricula.	<ol style="list-style-type: none"> 1 Review and enhance curricula. 2 Design and deliver a specific course in biodiversity conservation to BSc. level at the National University of Laos. 3 Ensure that environmental education is a standard part of the curriculum. 4 Create awareness of biodiversity issues among the new generation.

Programme 5: Institutional and Legal Frameworks		
Goal	Adjust national legislation and regulations related to biodiversity and harmonise them with MEAs.	Action 2010
Obj 1:	Strengthen institutional cooperation and enhance inter-department coordination in the conservation and sustainable use of biodiversity	<ol style="list-style-type: none"> 1 Review existing laws and regulations related to biodiversity. 2 Clarify the institution responsible for implementation as well as their mandate. 3 Identify and implement appropriate mechanisms aimed at governmental co-operation and co-ordination in biodiversity planning. 4 Integrate the conservation and sustainable use of biodiversity into sector macro planning. 5 Promote the inclusion of biodiversity goals and principles in planning schemes and strategic plans at all levels. 6 Harmonise international conventions (MEAs) with existing laws and regulations. 7 Accede to international conventions, which relate to biodiversity.
Programme 6: NBSAP Implementation		
Goal	Secure the NBSAP's implementation.	Action 2010
Obj. 1	Implement the strategy and action plan through priority actions within established timelines.	<ol style="list-style-type: none"> 1 Set priorities and time frames for each of the actions. 2 Develop suitable success indicators.
Obj: 2	Secure sufficient funding for the NBSAP's implementation.	<ol style="list-style-type: none"> 1 Assess the NBSAP's related costs, including both direct and indirect costs, and ensure that adequate funding sources are made available to cover these costs. 2 Obtain increased state budget allocations for biodiversity conservation activities. 3 Obtain increased foreign aid flows for biodiversity conservation activities. 4 Ensure adequate funding for training and research activities. 5 Strengthen the degree to which biodiversity is integrated into the operations of existing financial institutions. 6 Raise additional state revenues that can be reinvested in conservation activities. 7 Design NBSAP activities so as to minimise costs, and be financially efficient in their operations. 8 Develop prices and markets for biodiversity goods and services so as to ensure that consumers of biodiversity goods and services pay a fair of price for this use.
Obj: 3	Ensure that the NBSAP is complemented by provincial and bioregional strategies, and is supported by effective legislation where necessary.	Refer to Programme 5: Institutional and Legal Frameworks

Programme 7: International Co-operation

Goal	Promote country needs driven international co-operation. Action 2010	
Obj: 1	Ensure continued and effective international and regional co-operation with international governmental and non-governmental organisations in the conservation of biodiversity.	<ol style="list-style-type: none"> 1 Increase bi-lateral and multi-lateral co-operation, which is of mutual interest. 2 Promote cooperation, share information and exchange experiences. 3 Enhance international collaboration in research related to biological diversity. 4 Ensure that projects and programmes related to the conservation and sustainable use of biodiversity are included in the respective donor portfolios. 5 Ensure that impacts on biodiversity are considered as part of the planning cycles for internationally supported projects and programmes. 6 Ensure that opportunities to increase the level of technology transfer relevant to biodiversity conservation are included in donor programmes and projects.
Obj: 2	Support and encourage the Lao PDR's participation in Multilateral Environmental Agreements.	<ol style="list-style-type: none"> 1 Review the status of the Lao PDR's participation in all bilateral and international agreements relevant to the conservation and sustainable use of biodiversity to which the country is a signatory. 2 Ensure that all necessary steps are taken to fully implement these agreements. 3 Actively participate in and promote the development of new agreements and arrangements that are relevant to the conservation and sustainable use of biodiversity and that are in the Lao PDR's interests. 4 Maintain and strengthen the Lao PDR's participation in multilateral efforts related to biodiversity in areas outside the national boundaries, which are of mutual interest.

5.1 Institutional Arrangements

STEA and MAF are directly responsible for cooperation and coordination with concerned agencies including both central and local administration authorities and international agencies, and also for identifying sources of funding in order to support the implementation of the NBSAP.

All sectors, both at the central and local level have the responsibility to translate the NBSAP into their action plans, which are to be implemented effectively.

Mass organisations in collaboration with other agencies have the responsibility of contributing towards the support and encouragement of people to actively participate in the protection, conservation and sustainable use of biodiversity.

Internal and external private sectors running business in the Lao PDR must strongly support government sectors in the management, conservation and sustainable use of biodiversity.

5.2 Target Groups

The major target groups in the implementation of the NBSAP include:

- STEA, MAF and other relevant ministries,
- All relevant local government sectors,
- Mass organizations,
- Both the internal and external private sector running businesses in the Lao PDR,
- International organizations, both regional and sub-regional,
- Non-governmental organizations.

5.3 Funding Sources

Funding for the implementation of the NBSAP can be obtained from the following sources:

- The government budget allocated to each economic sector at both the central and local levels.
- The National Environmental Fund.
- The contributions from both the internal and external private sector running businesses in the Lao PDR.

- International organizations, both regional and sub-regional, including donor countries.
- Income from the use of biodiversity and biodiversity services.

5.4 Monitoring and Evaluation

The NBSAP is seen as a facilitator for the implementation of directives advocated by the National Socio-economic Development Vision in both regional and international contexts. It promotes the conservation of biodiversity and the sustainable use of the country's resources and confirms that the Lao PDR will contribute towards the international effort to implement the CBD.

Clear mechanisms, with the following areas of responsibility, should be established to ensure the implementation of the NBSAP:

- Co-ordination of the NBSAP's implementation at national, regional and international levels.
- Production of an annual report on policies, activities and plans for the implementers.
- Support of the local and private sector's participation.
- Production of regular reports on the status of the country's biodiversity.
- A revision of the NBSAP after the initial stage of implementation.

The monitoring and evaluation should be based on the indicators set forth and will be carried out at the end of each designed implementation phase. However, successful implementation will require the support from all partners and levels.

REFERENCES

Ministry of Agriculture and Forestry and Science Technology and Environment Agency. The Biodiversity Country Report, The Lao PDR. (2004)

Science Technology and Environment Agency. Draft of the National Environment Strategy. (2004).

Ministry of Agriculture and Forestry. The National Agriculture Strategy 2002. (2003).

Committee for Planning and Cooperation. The National Committee for Poverty Eradication. The National Poverty Eradication Programme 2002. (2003).

Government of Lao PDR. The National Socio-economic Development Programme 2005, 2010, and 2020. (2003).

1. The LAO PDR – An Overview

The Lao PDR is a country abundant with natural resources lying in the central Indochina peninsula between 13.54 – 22.31 degrees north and 100.05-107.42 degrees south. It is a landlocked country with total land area of 236,800 km², more than 40% of which consists of stocked forestlands. The Lao PDR's border stretches for 416 km in the north with the People's Republic of China for 492 km in the south with the Kingdom of Cambodia, for 1,957 km in the east with the Socialist Republic of Vietnam, and for 1,370 km in the west with the Kingdom of Thailand. The country is divided into sixteen provinces, one municipality and one special region. In 2002, it was estimated that the total population of the country was some 5.48 million people or 861,500 households, of which approximately 83% live in rural areas.

The Lao Front for National Construction (LFNC) – after research, classification and categorisation – introduced an official ethnic classification system with forty-nine main groups. These ethnic groups fall into four ethno-linguistic families, namely the Tai-Kadai, the Mon-Khmer, the Tibeto-Burmese and Hmong-Mien which are distributed from the north to the south of the country. Out of the four regions the north has the highest number of distinct ethnic groups comprising 87% of the region's population. The east has the second highest number with 69%, followed by the southern and central regions, each of which have ethnic populations of approximately 50%.

The climate of the Lao PDR is seasonally tropical, with a pronounced wet and dry season. The lowest levels of mean annual rainfall are about 1,300 mm in the northwest, while the highest levels are well above 4,000 mm in the southern Annamite range. The majority of the lowlands experience between 1,500-2,000 mm of rainfall annually.

The value of biodiversity also represents a significant source of national income contributing to the country's socio-economic development. Timber, processed wood and handicrafts made from natural products are all export commodities. Besides, biodiversity plays an important role in environmental protection. The combination of healthy ecosystems with diverse forests and aquatic resources can support agricultural production and prevent natural disasters such as flooding, landslides and drought.

The *prevailing economy* of Lao PDR is heavily dependent on natural resources as the country is dominated by subsistence production, with the majority of the population relying on farming and the collection of NTFPs for their basic livelihoods. In 2000, nominal GDP was estimated to be 13,483 billion kip or US\$ 1.65 billion (IMF 2002). Although per capita GDP increased from US \$114 in 1985 to US\$

330 in 2000, the incidence of poverty remains high. Thirty nine percent of the population are currently thought to be living in poverty and the Lao PDR is ranked 140 out of 174 in UNDP's Human Development Index, making it one of the poorest countries in the Asian region (ADB 2001a, 2001b).

Unfortunately, the last few decades have witnessed heavy losses in biodiversity resources due to the destruction of natural habitats which has been caused by the unsustainable use of resources and increasing population pressures. These losses can be attributed to the population increase in rural areas, the over-exploitation of NTFPs and available wood resources through legal and illegal logging, and the absence of detailed planning. Furthermore, some shifting cultivation practises, particularly pioneering shifting cultivation, the prevailing hunting and fishing practises and the illegal trade of wildlife have accelerated the loss of the nation's biodiversity. The loss of forest cover and biodiversity both have a short and a long-term negative impact on the environment, socio-economic development, and particularly the livelihoods of the Lao people living in rural areas.

2. Status on International and Regional Biodiversity

In May 1989, an ad hoc working group of experts on biological diversity was established to prepare an international legal instrument for the conservation and sustainable use of biodiversity. Taking into account the need to share costs and benefits between developed and developing countries and the ways and means to support innovation through an Intergovernmental Negotiating Committee (INC), seven working sessions (five negotiating) were held which culminated in using the Nairobi Final Act of the Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity 2000 (CBD).

The convention was opened for signatories at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in June 1992 and came into effect on the 29th of December 1993. As of the 31st of January 2003 there are 187 Parties to the CBD.

The principal objectives of the CBD are the conservation and sustainable use of biological diversity, and the fair and equitable sharing of benefits arising from its utilization. The Convention recognizes that the key to maintaining biological diversity depends upon using this diversity in a sustainable manner.

The Convention translates its guiding objectives of conservation, sustainable use and equitable sharing of benefits into binding commitments in its substantive

provisions contained in Articles 6 to 20. These articles contain key provisions on, among others, measures for the conservation of biological diversity, both in-situ and ex-situ, incentives for the conservation and sustainable use of biological diversity, as well as research and training. Additionally public awareness and education; assessment of the impacts of projects upon biological diversity; regulation of access to genetic resources; access to and transfer of technology and the provision of financial resources have been included.

In addition to its substantive provisions, the Convention establishes institutional arrangements that provide a mechanism for the further development of, and for monitoring the implementation of, the Convention through meetings, work programmes, reviews and negotiations. Three institutions have been established by the Convention, namely the Conference of the Parties (COP), the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) and the Secretariat. The Convention has also established a financial mechanism for the provision of financial resources to developing country Parties, and has made provisions for the establishment of a clearing-house mechanism (CHM) for scientific and technical cooperation. Furthermore, the Convention enables the COP to establish additional subsidiary bodies, as it deems necessary for the implementation of the Convention.

Since the adoption of the Convention, the COP has met six times and, on each occasion, has, through its decisions, taken the necessary steps to translate the general provisions of the Convention into practical action. These measures have included, among others, the adoption of programmes of work for a number of thematic areas and crosscutting issues, and the issuing of specific guidelines for funding through the Convention's financial mechanism for projects thereby ensuring the implementation of these programmes. Measures also consist of the establishment of ad hoc bodies to focus on the implementation of specific provisions of the Convention, such as those relating to access and benefit-sharing, traditional knowledge, and bio-safety. In reference to the latter, this process has led to the adoption of a new legal instrument, the Cartagena Protocol on bio-safety, itself a landmark treaty that provides an international regulatory framework for reconciling the respective needs of free trade and environmental protection in the context of a rapidly growing global industry.

Asia, as one of the richest biodiversity regions of the world, is facing an ecological crisis due to population pressure. The region has an average human density eight times higher than the rest of the world and consequently this puts enormous pressure on land and biodiversity

resources. A collapse of major ecosystems and a dramatic reduction in the numbers of species populations is not only eroding the livelihoods of billions of the earth's poorest citizens but is also causing major environmental disasters in the form of floods, landslides, droughts, desertification and smoke hazes. These problems are crippling the development of Asia's agricultural and industrial sectors.

In addition to the loss of habitat due to logging and agricultural expansion, the wildlife trade (both legal and illegal), pollution, alien invasive species, climatic change and the threats posed by genetically modified organisms (GMOs) are growing problems in the region. The most important issues are to initiate ways of taxing the main offenders and to reward those regions and communities whose actions either enhance or refrain from destroying such resources and services.

3. The Status of Biodiversity in the Lao PDR Lao Flora and Fauna

Surveys conducted in cooperation with foreign experts have recorded at least 166 species of reptiles and amphibians. Ten amphibian species are threatened and one specie is likely to occur only in the Lao PDR. Surveys have reported 247 mammal species including three new species. These consist of the *Muntiacus truongsoneis*, the *Muntiacus vuquangesis* and *Pseudoryx nghinhensis*, which occur only in the Annamite range, a landmass forming the boundary between the Lao PDR and Vietnam. Out of the reported number of mammal species, 60 have been classified as threatened.

Birds have so far been the best-surveyed class of animals in the country which according to a 1996 survey consist of 112 key-species, and are therefore of elevated conservation concern. In 1999 Duckworth et al adjusted this figure to 150 key-species, of which 27 species are globally threatened and 47 species are near threatened.

Surveys have recorded nearly 90 species of bats, of which 51 are considered to be key species. New species continue to be recorded on most of the recent surveys and as many areas in the Lao PDR have not been surveyed, more species are likely to occur. Many species are at risk of extinction due to their exploitation for food (Duckworth et al. 1999).

About 500 indigenous fish species are reported to live in the Mekong River and its tributaries in the Lao PDR according to a 2001 survey conducted by Kotellat and his team. Out of this number, nine species have been classified as threatened, and twenty-five are suitable for aquaculture.

NTFPs are important to the national and local economy, as they are used as a resource for subsistence as well as trade. NTFPs have a high commercial value and it is estimated that about half of the cash income of rural households is derived from NTFPs. Previously the focus has been on timber production and NTFPs have received little attention through the national forest policy. Their neglect has probably been due to their diverse and complex nature and their position outside of mainstream economic development.

Lao people consume wild vegetables, which are edible plants growing in their natural habitats, and include aquatic and terrestrial, annual or perennial plants. This tradition has been handed down from one generation to the next. Many species have been planted in home gardens but their use varies according to local traditions, culture, and naturally availability.

The Lao PDR lies within the centre of the domestication of Asian rice (*Oryza sativa* L.), and it is recognised to be the centre of origin of the glutinous rice types resulting in the country having become the largest producer and consumer of glutinous rice in Asia (Appa Rao *et al* 2001a). The cultivated varieties of lowland rain-fed and upland rain-fed rice differ considerably in morphological, physiological, agronomic, and grain quality attributes. In addition to the traditional varieties grown by farmers, hybrids from cultivated rice and wild rice are also commonly found.

The rice varieties found in the Lao PDR differ significantly in terms of their ecological requirements, as is the case of lowland paddy and upland rice and also for the different wild rice types. The National Agricultural and Forestry Research Institute (NAFRI) currently has 13,193 samples of cultivated rice genetic materials and 237 samples of wild rice in cold (medium term) storage. For long-term conservation, duplicate samples have been sent to the International Rice Gene bank at IRRI in the Philippines.

Medicinal plants are used in the prevention, diagnosis and treatment of diseases as well as ingredients for health products. The Lao PDR's location in Southeast Asia provides ecological systems with favourable conditions for the development of biodiversity, including medicinal plants that can be harvested for the production of traditional and modern medicine.

Main Causes of the Loss of Biodiversity

As highlighted in the BCR, the various causes which have led to the loss of biodiversity have a significant impact on livelihood systems and thereby have impeded the long-term goal of socio-economic development. The NBSAP must therefore address the following key causes:

- A) Economic causes
 - The unsustainable use and over exploitation of timber.
 - The conversion of ecosystems.
 - Pollution resulting from production processes.
 - An increase in the market demand for biodiversity resources.
 - Increased competition for the use of existing resources.
 - The use of chemical compounds in the agricultural and industrial sectors.
- B) Social causes
 - The scattered population distribution.
 - The rapid population growth.
 - The traditional life style and culture of ethnic minorities.
 - The war impact due to the previous use of chemicals and devastating weapons.
 - The fact that people continue to live in poverty.
- C) Natural/Environmental causes
 - The occurrence of floods, droughts, landslides and forest fires.
 - Infrastructure developments.
- D) Managerial causes
 - Current institutional frameworks and management systems are inadequate.
 - Laws have not been effectively applied and enforced.
 - Inadequate mechanisms are in place for the control of cross border traffic.

Biodiversity Conservation Efforts in the Lao PDR

The country's NBCA system was officially established in 1993 through the Prime Minister's Decree No 164 which resulted from the First National Forestry Forum in 1989. The total number of NBCAs rose to twenty after another two were added, and furthermore provincial and district PAs have also been established.. Additionally the following two contiguous areas were created to act as corridors between three NBCAs at the end of 2000 through the Prime Minister's Decree No 193:

- The corridor between NaKai Nam Teun NPA and Phou Hinpoun NPA.
- The corridor between Nakai Nam Teun NPA and Hin Nam Nor NPA.

In order to enhance the effective management of the NBCAs the GoL established and promulgated the following laws which have a bearing on biodiversity resources: The Forestry Law (1996), The Water and Water Resources Law (1996), The Electricity Law (1997), The Mining Law (1997), The Agriculture law (1998), and The Environmental

Protection law (1999). Once the above-mentioned laws had been issued, they were implemented through specific decrees and regulations by the relevant sectors. In addition, the GoL has also focused on environmental education and public awareness raising activities. Examples of these include Tree Plantation Day, Environment Day, and Wildlife and Fish Release Day. The Ministry of Education is currently developing the curriculum on biodiversity which is to be integrated into various levels of the education system.

These efforts illustrate the GoL's commitment towards the protection of the country's biodiversity and the enhancement of socio-economic development.

Currently the NBCAs system covers an area of 33,907 km², or roughly 14.2% of the country's land area, with the purpose of achieving the following three main objectives:

- The protection of forests, wildlife and aquatic animals.
- The maintenance of the natural abundance of biodiversity and environmental stability.
- The protection of areas of natural beauty for leisure and research.

Biodiversity and Socio-economics

Biodiversity plays an important role in socio-economic development as numerous activities in the economic sector as well as those in various other sectors rely on the use of and services from biodiversity resources. However, the identification of the role of biodiversity in socio-economic development is in its infancy in the Lao PDR and therefore is currently limited.

Biodiversity is of central importance to many of the key elements in the following socio-economic development priorities and targets:

- **Food production.** A major priority is to provide food for national self-sufficiency, and to generate a surplus that can be sold in cross-border regions and used in the food processing industry. Indigenous agro-biodiversity plays an important role in food production and food security, as well as in the generation of products that have a commercial and a trade value.

- **Commercial production.** This programme focuses on the production of goods for all significant sectors of the domestic market and for export to regional and international markets. Many components of biodiversity already have a significant commercial and trade value, which include agricultural and forest resources. There is a great potential for adding further value to sustainable biological resource harvesting and processing, and for developing new biodiversity markets and products.
- **Rural development.** The main purpose of the rural development programme is to alleviate poverty in rural areas through income generation and service improvement. Biological resources, including indigenous crop and livestock species as well as NTFPs, already provide the main livelihood source of some of the poorest sectors of the rural population. They also contribute to economic and livelihood security when other sources of production become unavailable. There is a demonstrated potential for using biodiversity resources - such as through ecotourism or NTFP processing - as a source of rural income expansion and diversification.
- **Service development.** A stated goal is to develop the potential of new and emerging sectors such as tourism and trade. Both of these targeted sectors already depend heavily on biodiversity, and have a high potential for further development.
- **Development of foreign economic relations.** Priorities are to make considerable use of global opportunities in order to develop the national economy, promote foreign direct investment, and improve economic co-operation with foreign countries and international institutions. There already is a high global interest in the Lao PDR's unique biodiversity, which is demonstrated by existing donor aid flows and tourist demand. There are also many other opportunities to promote foreign investment and to market elements of biodiversity on global markets.

ANNEX 2

THEMATIC AREAS OF THE NBSAP AND THE CONVENTION ON BIOLOGICAL DIVERSITY (CBD)

1 Nature Conservation Efforts (CBD Art. 7, 8, 9, 10)

In-situ conservation (Art. 8)

Context:

The Lao PDR's NBCA system was legally established in 1993 through Prime Minister's Decree No 164 in an effort to reduce negative developments such as the rapid decline in biodiversity resulting from unsustainable market and subsistence hunting, and accelerated habitat conversion.

The Decree lays out the system's three main objectives:

- Protection of forests, wildlife and aquatic animals.
- Maintenance of the natural abundance of biodiversity and environmental stability.
- Protection of areas of natural beauty for leisure and research.

Ministerial regulation 0524 describes how PAs should be administered, zoned and run. It provides for, and promotes the sustainable use of biodiversity in more than 1,100 villages that are inside and within a 5 km radius of the 20 existing national PAs. The PA system, although well planned, primarily conserves species through PA remoteness and terrain inaccessibility. Active conservation measures have had a slow start and it is estimated that conservation measures are fully operational in approximately 50% of the area designated as PAs. Experience with PA management suggests that at least two principles should be used to guide the development of the strategic approach to PA management.

Firstly, 'Participatory PA Management' means to jointly protect, enhance and manage PAs and their resources in a sustainable manner with guardian villagers and other stakeholders, for the benefit of local people and the nation as a whole. Participatory PA management is a core strategic principle that recognizes stakeholder villagers and communities as full partners in the PA management process, and gives local people an integral role in planning and management activities.

Secondly, the 'Integrated Conservation and Development' (ICAD) approach gives equal value and importance to both development and conservation in the management of PAs. It seeks an appropriate balance between conservation and development. The aim of integrating conservation and development is to ensure *"that development has positive outcomes for conservation, and that conservation has positive outcomes for development"*.

Impact on, and change within the PAs, has been caused by agricultural expansion and resource exploitation. As the

adjoining paper on the Lao PDR's wildlife indicates, 13 large animals have already become extinct in the country in recent times and 56 large bodied animals have populations smaller than 500 individuals. These populations are in danger of local extinction because of hunting and the wildlife trade. There is a lack of restrictions on current land-use activities and all the communities living inside the PAs have expanded their agricultural land such as rice fields and cash crop areas. While commercial cash crops have expanded, most villagers in rural areas derive their subsistence from traditional swidden agriculture. Population growth, migration and increased competition for land and forest resources are forcing swiddeners' expansion further into the primary forest.

Key Issues:

- The NBCA system does not fully represent all habitats and ecosystems.
- Unplanned village settlements are scattered and have developed within NBCAs.
- NBCAs with abundant resources are mainly located in the poorest regions of the country.
- The NBCA boundaries are unclear and not accepted by local communities.
- Some NBCAs are under increasing pressure from exploitation, encroachment and large development projects.
- NBCA management is not the first priority for local authorities that have jurisdiction over them.
- NBCA institutional arrangements are inadequate and still weak.
- Incomplete taxonomic studies and inventories of fauna and flora hamper assessment and monitoring of the true status of wildlife.
- NBCA staff lack knowledge and experience in NBCA management.
- The measurement of performance for violation and for good practice in relation to biodiversity conservation is currently inadequate.
- The government still lacks funds for on going NBCA management.
- Public participation in biodiversity management needs to be expanded.

Intervention Options:

- Include all relevant habitats and ecosystems in the Lao PDR within the NBCA system.
- Strengthen the NBCAs' management capacity.
- Improve the institutional and legal basis for PA management.

- Clearly determine NBCA boundaries.
- Improve public awareness of NBCA management by educating and enhancing the people living in and around NBCAs to actively participate in their management, and there by concurrently improving their livelihoods.
- Improve knowledge on taxonomy and the status of wildlife as well as biodiversity related issues in the Lao PDR.
- Provide sufficient funds, vehicles, and materials to ensure effective NBCA management.
- Review the existing NBCA network and management system.
- Identify and determine ecosystems zoning.
- Identify the key species for specific management.
- Implement ICAD objectives.
- Integrate NBCA management plans into cross sector planning at a provincial level.
- Exchange and share information on NBCAs with all concerned parties at regional, national and international levels.
- Enhance staff capacity building at various levels.
- Establish appropriate incentives and financial mechanisms for NBCA management.

Ex-situ conservation (Art. 9)

Context:

The Lao PDR lies within the centre of the domestication of Asian rice (*Oryza sativa* L.). Moreover, the centre of origin of the glutinous rice types is recognised to be within the country and it is also the main glutinous rice producer and consumer in Asia. The richness and diversity of rice varieties in the Lao PDR is reflected in the 3,169 distinct names given to the traditional varieties (Appa Rao et al. 2001b). The National Agricultural and Forestry Research Institute (NAFRI) has 13,193 samples of cultivated rice genetic materials and 237 samples of wild rice in cold, i.e. medium-term storage. For long-term conservation, duplicate samples have been sent to the International Rice Genebank at IRRI in the Philippines.

Other ex-situ conservation efforts in the Lao PDR such as zoos do not meet international standards and are therefore not recognised. Ex-situ conservation should be considered as support to in-situ conservation efforts. The more traditional infrastructures such as zoos, botanical gardens, herbariums, tree nurseries as well as the modern seed and gene banks will unfold their full potential if linked to an overall conservation and recovery concept.

Ex-situ conservation can play a very important role in

recovery programmes for endangered animal and plant species, provided that the species at risk are known. The general data deficiency hampers the necessary assessment and consequently the development of an integrated conservation approach. Without such an approach, infrastructure and human resource development needs cannot be defined. Furthermore, the responsibility for ex-situ conservation is not clearly defined.

Key Issues:

- Inadequate infrastructure for ex-situ conservation.
- Existing ex-situ infrastructure does not meet international standards.
- Ex-situ conservation efforts are scattered and in their infancy.
- The use of hybrids for high yield varieties may cause the loss of landraces and cultivars.
- Many institutions collect data, samples and cultivars independently, which occasionally overlap. A data sharing and exchange system needs to be put in place.
- There are no systematic studies on traditional and indigenous knowledge.
- A lack of qualified specialists in specific fields.
- Funds, vehicles and materials are currently inadequate.

Intervention Options

- Establish the conservation of threatened, endangered and endemic species as a priority.
- ສ້າງສູນຄຸ້ມຄອງພັນຊີວະນິດ ທີ່ເຫມາະສົມ ທີ່ ສະຫງວນຊີວະນິດ ທີ່ ສຳຄັນ ທີ່ ມີ ພື້ນທີ່ ທີ່ ສຳຄັນ ທີ່ ມີ ພື້ນທີ່ ທີ່ ສຳຄັນ.
- Establish a National Biodiversity Information Centre.
- Re-survey and reclassify species for management.
- Promote research on ex-situ conservation.
- Build the capacity of field specialists in various areas.
- Establish a National Natural History Museum.
- Develop an open zoo/botanical garden.
- Promote the participation of local and indigenous people in the planning and implementation process of ex-situ conservation.
- Increase public awareness of ex-situ conservation through education and training.

2 Forest Resources (Art. 8c, 8i, 8j, 8l, 10b, 10c)

Context:

Forests in the Lao PDR are classified into five management systems, namely protection forests, conservation forests, production forests, rehabilitated forests and degraded

forests. Approximately 2.5 million ha are designated as production forests, but it is estimated that forests with the potential for commercial production may total more than 5.6 million ha. Only 57,000 ha of plantation forests are available for production, which is less than half of the 113,000 ha of planted areas (Draft Strategy of Forest management, 2020). Virtually all forest resource extraction can therefore be considered to originate from natural forests and to comprise indigenous species.

Indigenous forest resources yield five main categories of direct economic benefits: commercial timber exploitation, household wood consumption, fuel wood use, and NTFPs harvested at household and commercial levels.

Forest cover in the Lao PDR is estimated to be at 41% of the total land area and this remains amongst the highest in the region. However, rapid deforestation has resulted from encroachment of lowland farmers and expanding shifting cultivation in mountainous areas, forest fires, commercial forest extraction and infrastructure development.

Specific concerns about logging include inadequate systematic management or planning inventories, low regeneration; overexploitation by legal and illegal operations, and long-term planning in the setting of logging quotas; and the selection of logging sites with little or no consideration of sustainability.

The expansion of shifting cultivation in forest areas has increasingly contributed to deforestation, with an estimated annual clearance of about 300,000 ha. The GoL has therefore prepared and implemented a national priority programme, namely the stabilisation of slash and burn practices in view of restricting clearance of forestland for agriculture. As result shifting cultivation was decreased by about 25,000ha between 1998 and 2000.

Timber

A commercial logging industry exists in the Lao PDR and official statistics suggest that a total of 3.3 million m³ of timber were harvested between 1995 and 1999, or an average of just under 650,000 m³ a year.

Production forests are thought to contain commercial timber of between 100-150 m³/ha, and the total annual allowable cut has been determined to be 282,580 m³/year. The balance of commercial timber is supplied from conversion. There has been an increasing reliance on log production from infrastructure and land development projects and between 1995-1999 almost two-thirds of harvested logs came from this source.

With an average annual commercial timber demand of some 646,000 m³ approximately 17.5% is destined for

export and the balance - just over 530,000 m³ a year - is utilised domestically. Log production supports various domestic forest industries, including sawmills, plywood, veneer, parquet, poles, furniture and door production. All of these industries have expanded rapidly over the last decade and it is estimated that the wood industry's operating capacity almost doubled from just over 300,000 m³ in 1988 to just under 600,000 m³ in 1999. More than 130 sawmills, 2 plywood factories, 28 wooden furniture factories and 3 parquet factories currently operate in the Lao PDR. Applying current prices to the commercial log harvest suggests that formal-sector timber exploitation has a market value of some Kip 530 billion a year, of which just over a quarter derives from export earnings.

Timber is also harvested non-commercially in order to meet household demands for construction and repair, fencing, poles, furniture and other domestic uses. A large proportion of this type of exploitation is carried out in degraded and non-production forests, whereby small diameter, non-commercial timber is extracted.

Estimates of household timber consumption vary greatly, and timber use also differs between regions, social categories and ethnic groups. At a national level, it is thought that household wood consumption for non-energy purposes equates to between 0.14 and 0.15 m³ per capita per year for rural households. The BCR assumes an average rural household wood consumption of 0.15 m³ per capita per year. These data suggest that an average of just over 680,000 m³ of wood a year is consumed at a household level - a volume that is approximately equivalent to commercial wood exploitation. Applying average prices for pole wood and low-grade timber to this exploitation gives a market value of just under Kip 170 billion a year for household timber consumption.

Non-Timber Forest Products

NTFPs play a central role in the rural economy of the Lao PDR, and have been studied extensively as a result. Wild plant species provide a wide range of products for consumption and production including wild plant proteins and edible plants such as mushrooms, bamboo shoots, wild fruits and vegetables and honey. NTFPs also provide materials for household construction and handicraft production including bamboo, rattan, pandanus, broom grass and paper mulberry. They are also the ingredients of traditional medicines and are also used for livestock fodder and pasture.

NTFPs are known to be a particularly important component of household subsistence, especially food consumption. Villagers rank wild foods consistently as the most important forest resource. It is estimated that wild

foods contribute between 61-79% of non-rice food consumption by weight, and provide an average of 4% of energy intake, 40% of calcium, 25% of iron and 40% of vitamins A and C. They are also commonly used as buffers against seasonal and emergency food shortages.

In addition to subsistence consumption, NTFPs also generate cash earnings. Subsistence products are collected and sold especially during the peak season in local markets and to exporters. Food items such as wild animals, insects, frogs, mushrooms, bamboo and rattan shoots, wild vegetables, bamboo culms, and rattan canes are sold everywhere at local markets in urban as well as in rural areas and at roadsides almost throughout the year. Wild orchids are also widely sold for ornamental purposes.

National studies have found that sales of NTFPs are worth an average of 11% of cash income, rising to 55% in forest-rich areas. In many parts of the country NTFP cash income is far in excess of the national average. For example surveys carried out in Houaphanh Province found that NTFPs contributed an average of 38% of village cash income, rising as high as 56% for households living within and adjacent to forests and on the Nakai Plateau NTFPs accounted for over three quarters of family income.

Although it is difficult to aggregate these data at a national level due to the wide variations of social and cultural systems, livelihoods, dependency on forests, as well as access to other sources of production and consumption, estimates have been generalised for the country as a whole. On average NTFPs are worth a total of almost \$320 per year for rural households in the Lao PDR, contributing to about 44% of subsistence value, 55% of cash income, or 46% of the total household economy.

Taking these average household data into consideration NTFPs may be worth some Kip 2.6 million per household per year or Kip 1,837 billion in total. Firewood, fish and aquatic resource consumption values have been excluded from this figure.

NTFPs also have a high industrial and trade value. The most important components of the commercial NTFP harvest are mainly plant exudates (resin, oleo-resin, Siam benzoin), medicinal plants, spices/condiments, plant barks (paper mulberry or “po sa” / *Broussonetia papyrifera*, *Persea kurzii*, *Boehmeria malabarica*), fruits (Malva nuts / *Sterculia lychnophora*), sugar palm (*Arenga pinnata*, *Dialium indum*), and stems (bamboo, rattan, broom grass).

Key Issues:

- Insufficient quality and quantity, as well as an inefficient allocation of staff within the forest management system.
- Inadequate inter agency coordination.
- Inadequate law and regulation enforcement.
- Inadequate regulations on forest and village land classification and delineation.
- Timber exploitation and NTFP harvesting in provinces is not conducted according to the annually allocated quotas, or according to technical guidelines.
- Management have inadequate use of materials, tools and vehicles.
- Inadequate technical knowledge and experience on plantation and NTFP management.

Intervention Options:

- Maintain a healthy and abundant forest cover and expand forest cover areas.
- Provide sustainable production for local consumption as well as for external demands, which takes into account the protection of the environment.
- Translate laws and regulations and ensure that they are strictly enforced.
- Revise the forest production system.
- Provide sustainable management of NTFPs to ensure an improvement in rural livelihoods.
- Improve the tree plantation and forest management system, as well as promote reforestation.
- Revise and develop specific regulations.
- Establish an information database on forest resources.
- Enhance the local, public and private sectors' participation in the protection and utilisation of forest resources.
- Clearly define forest areas mentioned in the Forestry Law.
- Promote alternative development to shifting cultivators.
- Develop ecologically sound logging systems with a limited environmental impact.
- Control NTFP and medicinal plant collection.
- Improve both the quality and quantity of staff responsible for the management of forest resources.

3 Wildlife Resources, Wild Plants and Living Aquatic Resources (Art. 8c, 8i, 8j, 8l, 10b, 10c)

Animal Wildlife

Knowledge of the varying locations of species occurrence is fundamental to biodiversity conservation. However apart from sparse information on some aquatic groups, there currently is no solid documentation available on Lao invertebrates, the largest and most varied group of organisms on earth and in the Lao PDR itself.

The overall amphibian and reptile composition of the Lao PDR still remains unknown. Previous reports on the herpetofauna are based largely on secondary, regional accounts or are extrapolations from documented occurrence in adjacent countries. Even the single attempt to catalogue any component of the herpetofauna, Deuve's "Serpents du Lao", contains suppositions and records that could not be traced to museum specimens.

Birds are the best-surveyed class of animals in the country, and knowledge is based on surveys carried out between 1949 and 1996 in 20 NBCAs in combination with incidental records from other areas. Approximately 700 species of birds are known or have been provisionally recorded in the Lao PDR and another 100 or so are reasonably likely to occur (some seasonally). In comparison, however, with neighbouring countries they remain insufficiently known.

Twenty-seven Globally Threatened and forty-seven Globally Near-Threatened species are known from the Lao PDR, and as 70% of these bird species have been recorded in the country to date, it makes the Lao PDR an important country for bird conservation.

Despite the size range of mammals, they are generally less well known than birds of the same region, this particularly being the case in the Lao PDR; however 247 species of mammals are reported to occur. There seem to be no confirmed Lao records for several species likely to occur (even though they existed in the past with some being of high conservation concern), 36 species are considered Globally Threatened and 32 species Globally Near Threatened.

Plants

There are an estimated 8,000 – 11,000 species of flowering plants. Approximately one-third of the plants of the Indo-Chinese bio-geographic sub-region are endemic to the sub-region, which covers most of the Lao PDR. Botanical research, including taxonomical studies began in the country in the mid-nineteenth century. Before the foundation of

the Lao PDR in 1975 the most important botanical studies were carried out within the flora-projects: "Flore Générale de l' Indo-Chine" (1907-1951) and "Flore du Cambodge, du Laos et du Vietnam" (1960).

Compared to its neighbouring countries, there have been very few studies on plant taxonomy in the Lao PDR since 1975. Most of these have not been comprehensive and have generally been performed by untrained botanists. Although there is no national herbarium in the country, many institutions have established their own herbarium, namely the Faculty of Natural Sciences, the Faculty of Forestry (the National University of Laos), the Traditional Medicine Research Centre (TMRC) and the Forestry Research Centre. Unfortunately, a great deal of the material collected has been destroyed due to a lack of suitable storage facilities.

Living Aquatic Resources

Rivers, water bodies and other natural and constructed wetlands are estimated to cover just under 945,000 ha or 4% of the Lao PDR, including 254,000 ha from the Mekong and other major rivers, 57,000 ha from large reservoirs, 96,000 ha from swamps and wetlands, 480,000 ha from rice fields, 10,300 ha from fish ponds, and 47,400 ha from small reservoirs, ponds and weirs (DLF, 2001). These wetland resources support a large fishery, as well as yielding a wide range of other aquatic animals that are harvested for household consumption and trade. With the exception of a small number of introduced fish used for aquaculture, almost all of the fish caught in the Lao PDR are indigenous species.

The most extensive knowledge of aquatic resources is related to fish but other aquatic resources such as amphibians, reptiles, molluscs, crustaceans, and water insects have not been well researched. About 500 indigenous fish species are reported to live in the Mekong River and its tributaries in the Lao PDR. Of these, 9 species are threatened, and 25 species are suitable for aquaculture (DLF, 2001).

Ongoing research carried out by MAF in cooperation with MRC on fish habitat and spawning grounds aims to fill important gaps in knowledge. The introduction of other species to captive breeding is also the topic of ongoing research.

Fish, frogs, turtles, snails and other living aquatic animals cater for more than 50% of the animal protein consumed by the population in the Lao PDR and is of critical importance to national food security. Official MAF statistics (2002) mention an annual fish production in the range of 83,500 tons of which 55,500 tons derive from fish culture with the remainder originating from natural sources such

as rivers, reservoirs, and swamps. According to MAF statistics, the annual fish consumption is estimated to be 16 kg per capita.

Key Issues:

- Population growth has caused an increase in hunting and unsustainable fishing practices for subsistence.
- An imbalance of the ecological process has occurred due to large-scale development projects and the introduction of exotic species.
- Low and ineffective law enforcement. The introduction of exotic species is unregulated and there is no specific law on the management of aquatic areas and wetlands.
- Relevant laws and regulations have not been adequately disseminated to the public.
- Clearance of forests and other habitats for agriculture (principally rice) and other purposes.
- Forest fires, including the burning of forests to catch wildlife, as well as droughts.
- The impact of the war and the remaining unexploded ordinance.
- The use of chemicals in the agricultural sector and industrial waste.
- Commercial logging, both legal and illegal.
- Infrastructure development has a destructive impact on wildlife and wild plant habitats.
- The participation of the government, the private sector and the general public in conservation activities is still inadequate.
- The embankment and conversion of natural wetlands for agriculture, construction or other purposes affects aquatic habitats.
- Scientific knowledge of and data on species is limited.
- The existing lists of species are not properly defined and are not appropriate for Lao conditions.

Intervention Options:

- Ensure the protection, conservation and recovery of endangered species in their native habitats.
- Enhance wildlife and wild plant resources conservation efforts through flagship species.
- Improve the management and sustainable utilisation of aquatic resources, wildlife and wild plants.
- Improve and enhance the living aquatic resources management systems.
- Improve, disseminate and enforce relevant laws and regulations.
- Enhance capacity in the implementation of laws and regulations related to PAs and wildlife.

- Review and revise existing national legislation with respect to the management of the trade in wildlife, wild plants and aquatic resources.
- Encourage the participation of all stakeholders at all levels, including local and indigenous people.
- Limit the illegal hunting and trade of wildlife and wild plant resources and enforce punitive measures for offenders.
- Control the importation of alien invasive species.
- Design, protect, and manage habitat corridors linking PAs.
- Include mandatory independent environmental impact assessments for major development projects.
- Control the hunting, fishing and harvesting of wild plants along country boundaries.
- Improve taxonomic knowledge and data information management systems.
- Enhance public awareness, education and training.

4 Agricultural Resources (Art. 8c, 8i, 8j, 8l, 10b, 10c)

Context:

Farming, particularly rice production provides a basic source of livelihood for the majority of the Lao PDR's population. Indigenous crops and livestock varieties and their genetic diversity play an important role in agricultural production. Traditional land use practices and farming systems contain high levels of agro-biodiversity, and are made up of a wide range of domesticated, semi-cultivated, transferred and non-cultivated wild species.

Agro-biodiversity yields have multiple economic values. Direct values include food production and income generation, which are relatively easy to quantify in monetary terms. Although more difficult to value, the conservation of indigenous crop and livestock varieties on farms also has a high economic benefit in terms of preserving genetic diversity, providing resistance to pest attack, disease and climatic variation, and thereby minimising risk in agro-ecosystems.

Rice has long been a staple food and cash crop in the Lao PDR, which lies within the primary centre of origin and domestication of Asian Rice, *Oryza sativa* L. To date 13,193 samples of cultivated rice have been collected in the country, including wild species such as *Oryza ranulata*, *O. nivara*, and *O. rufipogon*, along with spontaneous inter specific hybrids between wild and cultivated rice. The proportion of rice production in the Lao PDR made up of indigenous varieties has however been decreasing over time, as improved cultivars and introduced varieties have become

more common and have been promoted by the government's agricultural extension agencies and donor projects. In 1993 it was estimated that less than a tenth of the rainfed lowland area was grown under improved varieties. By 2000 more than 70% of the area in some provinces along the Mekong River valley was planted with improved varieties, and all of the dry season irrigated rice was composed of introduced or improved varieties - today only upland fields are planted wholly with traditional varieties.

Nearly 750,000 ha were planted with rice in 2001, of which just over a fifth was comprised of upland rice, nearly two thirds of lowland rice and 14% was grown under irrigation. National rice production was in excess of 2.3 million tonnes, with a total market value of almost Kip 2,000 billion. It is known that upland rice production entirely consists of traditional varieties, while dry season irrigated rice uses only introduced or improved varieties. It is assumed that about half of lowland rainfed rice is planted with traditional varieties. Applying current market prices, this gives a total value for traditional rice varieties of approximately Kip 930 billion a year.

No data on non-rice indigenous crop varieties are available for the Lao PDR. It is possible that mung bean and soybean production, as well as a proportion of vegetables and tubers, utilise various wild-related species, indigenous varieties and ancestral forms of cultivated plants. In 2001, more than 3 million ha were planted with these crops, yielding an output of nearly 750,000 tonnes of produce.

With the exception of limited commercial pig, chicken and cattle farms in and around urban centres, the majority of livestock originate from stock domesticated within the Lao PDR or in nearby China and Vietnam, and can be considered to be indigenous or traditional breeds. Almost all livestock depend primarily on natural vegetation and crop residues for their energy intake. The BCR assumes that the full output of buffalo, cattle, pig and poultry production depends directly on indigenous biodiversity. Including off take for domestic consumption and for export, estimates have been made that indigenous livestock production has an annual value of almost Kip 780 billion.

Livestock production under traditional management practices has an additional benefit to agriculture in terms of maintaining soil fertility for crop production. There is little use of chemical inputs in most farming systems in the Lao PDR. Cattle and buffalo, grazed on harvested or fallow fields, provide manure, which supplements soil nutrients and maintains soil fertility. Local breeds of cattle and buffalo produce an annual average of 0.7 tonnes of dung per head, containing 1.4% nitrogen and 1.3% phosphorus, which is equivalent to 9.8 kg of combined nutrients. Assuming that

a quarter of livestock manure is applied to fields, and using the replacement cost of fertiliser expenditures avoided suggests an annual value of Kip 11.12 billion for the contribution of livestock manure to soil fertility.

Key Issues:

- Uncontrolled utilisation of chemical inputs by farmers who are unfamiliar with their use.
- Inadequate inter-sector co-ordination.
- Poor management of irrigation systems.
- Inadequate and ineffective enforcement of laws and regulations.
- Use of improved varieties may cause the loss of indigenous genetic varieties.
- Conversion of agricultural land for other purposes.
- Mono cropping in the uplands resulting in the depletion of soil fertility and thus lowering productivity.
- Farmers have difficulties accessing credit and markets.
- Lack of registered crops and agricultural land.
- The technical knowledge of farmers remains low.
- Insufficient information of markets and marketing for farmers.

Intervention Options:

- Strengthen local and community based management of irrigation systems.
- Review and revise existing regulations on agro-business.
- Monitor tangible progress of regional trading in agricultural products.
- Expand and strengthen the participatory land allocation and land use tenure.
- Support and encourage farmers to produce and utilise bio-fertilizer, animal manure, compost, and green manure.
- Prioritise research, trials and demonstrations of new plant and animal species.
- Promote the transfer of irrigation management and community managed irrigation programmes.
- Prepare an agro-biodiversity conservation programme, which takes into account the requirements of the agricultural transition process.
- Analyse further regional trade opportunities.
- Classify land use and agro ecological zones based on landform, erosion risk and other criteria.
- Introduce a sedentary agricultural system for upland farmers.
- Encourage farmers' demand driven research.
- Facilitate farmers' access to credit and markets.

5 Energy Resources (Article 8I, 14)

Hydropower development

Context:

Hydropower, as the most abundant energy source in the Greater Mekong River Basin, is one of the Lao PDR's most important sources of foreign exchange. Estimates regard approximately 18,000 MW as technically exploitable but less than 5% of the country's hydropower potential had been developed by 2002.

Currently nine major hydropower plants are in operation. Existing medium and large-scale hydropower dams rely on a total watershed area of more than 4 million ha, consisting of primary forest, forested and unstocked land. With a combined installed capacity of over 4,000 MW and an annual power generation capacity of almost 20,500 GWH, the traded value of power generated by these schemes is over Kip 7,000 billion a year.

Although forest cover is still extensive over much of the Lao PDR and siltation and sedimentation rates remain low by international standards, soil erosion resulting from deforestation is becoming a major issue in rivers such as the Sebang Hieng, the Se Done, the Nam Ou and the upper and lower stretches of the Mekong River.

Key Issues:

- Watershed management and protection is currently inadequate.
- Most of the Lao PDR's major proposed hydropower development potential is located within and around NBCAs.
- Hydropower development often results in reduced forest cover, wildlife habitats and biodiversity resources.
- Dam construction has a direct impact on fisheries and local income, especially in down stream areas.
- Some hydropower construction has occurred without prior detailed studies.
- The resettlement of the local people can have a direct and indirect impact on biodiversity.
- Dam construction changes the natural water flow.
- There is high and increasing demand for electricity both for local consumption and for export and subsequent foreign exchange earnings.
- The compensation schemes for lost land and property are not clearly defined according to different scales.

Intervention Options:

- Ensure that hydropower development takes social and environmental concerns into consideration.

- Manage and protect forests in watershed areas.
- Effectively enforce relevant laws and regulations.
- Ensure that environmental and social impact assessments are effectively applied for hydropower projects.
- Promote effective and economical energy use, as well as the utilisation of renewable energy.

Fuel wood

Firewood provides the major energy source for about 85% of the population, and is used for heating, cooking and lighting by almost all of rural households. Estimates of rural firewood consumption show extreme variations, ranging from 0.75-2.92 m³ or 0.58-2.26 tonnes per capita per year. The BCR takes an average per capita consumption of 1.2 tonnes per year, which is a conservative estimate for rural households in the Lower Mekong Region, and accounts for variability between seasons, ethnic groups and regions.

A minority of urban dwellers, and various industries, also utilise fuel wood. Detailed studies have been carried out on the volume of charcoal utilised by urban dwellers and industries (estimated at 42,146 tonnes or 280,973 m³ wood a year), and for firewood demand in cardamom, coffee, tea, brick, salt and tobacco processing industries (estimated at 111,118 tonnes or 143,468 m³ of wood a year). Applying current prices suggests that household and commercial fuel wood consumption has a total annual value of some Kip 45.75 billion, and accounts for the exploitation of more than 5.6 million tonnes or almost 7.5 million m³ of raw wood a year.

It is worth noting that these figures of 5.6 million tonnes or 7.5 million m³ of fuel wood consumption per year are much higher than previous estimates which ranged from 1.5 million m³ for rural firewood consumption, to almost 3 million m³ for all firewood consumption. Figures generated by the BCR are between two and a quarter and five times higher than these previous estimates. Three main factors account for this difference. Firstly only a few of the previous estimates included either charcoal or commercial firewood demand in their calculations. Secondly, there was a great deal of inconsistency between per capita estimates and whole-country data, and finally household numbers used in the BCR were updated to 2002 population levels.

Key Issues:

- The majority of the rural population uses fuel wood as the main source of energy.
The high demand for fuel wood and charcoal in urban areas has resulted in it becoming a tradable commodity.

- Uncontrolled exploitation has a negative impact on young trees, regeneration areas and leads to deforestation.
- The use of other sources of energy is too costly for the majority of the local people.
- Not all of the wood potential is being efficiently utilised.

Intervention Options:

- Ensure a sustainable fuel wood supply.
- Improve forest management.
- Promote the use of other renewable energy.
- Promote reforestation as a source for fuel wood, as an alternative to natural forests.
- Consolidate the national policy on energy development.
- Develop regulations related to the management and enhancement of the complex utilisation and regeneration process of fuel wood.
- Promote the utilisation of energy efficient stoves.

6 Water Resources (Art. 8I, 14)

Context:

The Lao PDR possesses a great wealth in water resources, having per capita the largest renewable freshwater supply in Asia. However, only 60% of the urban, and 58% of rural population, have direct access to adequate drinking water. An estimated 35% of all the water in the Mekong River originates from watersheds within the Lao PDR. The water quality of the Mekong River is still high and it therefore has a correspondingly high oxygen content. About 80% of all water flows in streams during the rainy season, which reduces to 20% during the dry season

The Lao PDR's renewable freshwater resources are estimated at an annual supply of 270,000 million m³, or almost 50,000 m³ per capita at current population levels. As well as being essential to human survival and providing essential flows to natural ecosystems freshwater resources have a wide range of economic uses and support a wide range of domestic and industrial activities. The total annual water demand has been estimated at 228 m³/capita/year, or 1.25 billion m³, of which agriculture is estimated to account for 82%, industry 10% and domestic use 8% of total withdrawal.

Water resources are used in agriculture, industry, communication, tourism, education, research and the daily livelihoods of people. They are a major source of protein and income for rural populations. Recent surveys revealed that a sizable segment of the poor population has no or

only limited access to safe water despite the abundance of surface water and groundwater resources which are the main sources of the potential water supply for rural areas and small towns.

Hydropower will remain a major economic sector and will have further impacts on water resources as well as fisheries, cultivated land and forests. Current projections predict an increased demand for water in the long term, and predictions are that competition for water is likely to become a problem in the near future if the management of water resources is not strongly implemented.

The Lao PDR has a total irrigated area of over 515,000 ha, including approximately 100,000 ha planted with rice as well as those areas planted with other crops such as vegetables. If it is assumed that half of the annual vegetable production is produced under irrigation, and taking into account all irrigated rice production, the gross value of output arising from the use of water supplies for irrigated agriculture is in excess of Kip 830 billion a year. Urban water consumption in the Lao PDR is estimated to be over 200 million m³ a year.

The loss of forested catchment areas and the lack of headwater protection also affect economic production through the downstream damage costs arising from the increased incidence of flooding and dry-season water supplies. No detailed data are available on the relationship between deforestation and the incidence of downstream floods and low flows. It is however known that between 1995 and 1999 floods, some of which may have been caused or exacerbated by deforestation in upper catchments, destroyed more than 170,000 ha of agricultural land. At an average gross return to rice cultivation of 2.7 million kip/ha/year, flood-related costs to production may have been as high as Kip 463 billion for this period, ranging between Kip 22 billion and Kip 182 billion a year.

Natural wetlands retain wastewaters and physically, chemically and biologically eliminate pollution from them. While wetland plants trap sediments and remove nutrients and suspended solids, pollutants and pathogenic organisms accumulate and decompose in the wetland's bottom sediments, and effluents are diluted. These functions play an important role in assuring local water quality, and maintaining the quality of water entering other water bodies and rivers.

Key Issues:

- The management of the use of ground water is not fully regulated.
- The uncontrolled settlement along riverbanks, which includes housing and factories.

- An increase in water problems such as periodic shortages, flooding, contamination and a reduction in water quality.
- River bank erosion occurs rapidly due to natural processes and human activity.
- The destruction of headwater forests has an impact on economic production.
- Some infrastructure development has an impact on water resources.

Intervention Options:

- Control the utilisation of chemical compounds in the agricultural and industrial sectors and ensure their treatment before they enter rivers.
- Improve laws and regulations and strengthen the implementation of water resources management.
- Develop regulations for the management of bank erosion, drinking water and water consumption.
- Protect and maintain natural wetlands.
- Assess the downstream impact of catchment deforestation.
- Assess the impact of infrastructure development.
- Establish a fund for the protection of bank erosion.
- Promote the management of water sources.

7 Industry, Technology and Services (Art. 8g, 8l, 14, 15, 16, 19)

Industrial development

Context:

The Lao PDR's relatively undeveloped industrial sector, which currently accounts for about 15 percent of GDP, is composed of cement factories, wood processing plants, garment industries and hydroelectric power stations. The structure of the industrial sector has changed significantly during the last decade from the complete domination of state-owned enterprises (SOEs) in the early 1990s to the current emergence of the private sector comprising of small & medium scale enterprises (SMEs). These now play a key role, and more than 20% of all households have their own business.

Due to the limited size of the industrial sector in the Lao PDR, environmental damage from industries is currently not as great a concern as issues relating to resource management in the agriculture, forestry and water sectors. The ambient effects of industrial activities are still minor and localised, but with the growing trend of industrial expansion, environmental concerns in relation to

industrialisation and urbanisation will become increasingly important. This calls for the creation of adequate EIA systems, the establishment of adequate discharge standards, and the strengthening of systems for monitoring, evaluation and environmental inspection.

Key Issues:

- Socio-economic growth and the high demand for industrial products.
- The lack of a master plan for industrial development at a national level.
- The majority of industrial plants and factories are located within urban areas.
- The lack of infrastructure in designated industrial zones.
- There are no human resource standards for industrial development.
- Certain industries such as paper mills and brick and salt manufacturers consume a lot of fuel wood as a source of energy.
- An inadequate approval procedure related to inter-sector co-ordination.
- Inadequate public participation in industrial development.
- The production and release of harmful wastes into the water and air.
- The lack of technical equipment and standards for environmental monitoring of the industry.
- Weak law enforcement and no specific laws relating to environmental monitoring.
- Inadequate staff capabilities in the field of industrial management.

Intervention Options:

- Promote sound environmental and industrial development for local consumption and export.
- Ensure the minimisation of impacts on biodiversity during the process of industrial development.
- Establish sustainable industrial processes.
- Promote the use of clean environmentally friendly technology.
- Promote public participation in the industrial development process.
- Enhance industrial zoning and improve the facilities in existing industrial development zones.
- Promote industrial development outside of major urban areas.
- Improve inter-sector co-ordination.

- Establish environmental standards for managing industrial development.
- Establish funds for small and medium sized industries.

Access to Genetic Resources (Art. 15, 16)

Context:

Genetic resources include microorganisms as well as living organisms such as DNA, single celled organisms, bacteria, plants, animals and human beings. Agenda 21 of the CBD lays down the framework for the shared access of genetic resources and highlights the benefits to be gained by all concerned.

Plants and animals have always been transported either from country to country or from continent to continent to be used outside their region of origin as cultivated plants, as improvements for seed and domesticated animal-breeds, or as medicinal plants. The modern methods associated with biochemistry, molecular biology and above all gene technology, have brought a rapid growth in the demand for genetic information for the various fields in which it is applied. It is often the countries of the south, with their huge wealth of biodiversity, who supply genetic information. The vast majority of plants, animals and micro-organisms still remain essentially unexplored as far as their potential use is concerned. At the same time, their habitats are in danger and many species are threatened with extinction. The traditional knowledge of indigenous peoples and of local communities related to the possible uses of the biological diversity that surrounds them is an important resource, particularly in the search for new medicines.

The Lao PDR has one of the richest biodiversity resources in the Asia-Pacific region. The local people have been applying their own traditional knowledge in their daily lives, and this is a strong basis for sustainable socio-economic development and environmental protection.

Key Issues:

- The lack of regulations relating to the protection of biodiversity and traditional knowledge.
- Co-operation with international partners is still limited.
- Genetic resources as a national asset have been procured, developed and utilised and licences should be issued to legitimise their use.
- Insufficient understanding and unclear responsibilities currently exist in relation to access to genetic resources and benefit sharing within the relevant agencies, as this is a new concept in the Lao PDR.
- The lack of information and knowledge concerning the use of genetic resource at an international level.

Intervention Options:

- Draft and enact legislation on access and benefit sharing for genetic resources originating in the Lao PDR.
- Collaborate and exchange data and information with international partners in order to gain experience in this field.
- Translate and develop international regulations into the Lao context.
- Develop capacity in the field of modern biotechnological research.
- Promote and raise public awareness on the protection and use of genetic resources and traditional knowledge.
- Participate in the renegotiations of international agreements on benefit sharing between the owners and processors of genetic resources.

Biotechnology and Bio-safety (Art. 19)

Context:

Biotechnology is the use of genetic resources in scientific and industrial processes for the creation of particular products to solve socio-economic and environmental issues.

The scope of biotechnology ranges from classical processes such as fermentation and the development of vaccines through to modern biotechnology which includes the genetic modification of organisms; specifically the introduction of micro organisms into plants, animals and human beings in order to produce particular characteristics.

The Cartagena Protocol on Biosafety calls on contracting states to control the risks associated with the use and distribution of modern biotechnology for the health of humans or animals and the original biodiversity.

Key Issues:

- A lack of regulations and measuring tools on the use of modern biotechnology according to established standards.
- A lack of data and knowledge of the importance of the results of research in the field of biotechnology, as well as the associated risks.
- Public unawareness of the potential risks to the sustainable use of biodiversity resources caused by GMOs.
- Insufficient scientific studies and limited use of biotechnology in the Lao PDR.

Intervention Options:

- Develop regulations on the management, research and use of biotechnology, which may pose a risk to the health and safety of humans and animals as well as biodiversity.

- Conduct research into the use of biotechnology for socio-economic development and protection of the environment.
- Develop regulations on the management of modern biotechnology that may impact on health and safety of humans and animals as well as biodiversity.
- Develop the research and use of biotechnology to contribute to:
 - ⇒ ພັດທະນາ ການຄົ້ນຄວ້າ ກ່ຽວກັບ ການໃຊ້ ທັກສະນະ ທາງ ບຸກຄະລາກອນ ທາງ ບຸກຄະລາກອນ.
 - ⇒ ພັດທະນາ ການຄົ້ນຄວ້າ ກ່ຽວກັບ ການໃຊ້ ທັກສະນະ ທາງ ບຸກຄະລາກອນ ທາງ ບຸກຄະລາກອນ.
 - ⇒ ພັດທະນາ ການຄົ້ນຄວ້າ ກ່ຽວກັບ ການໃຊ້ ທັກສະນະ ທາງ ບຸກຄະລາກອນ ທາງ ບຸກຄະລາກອນ.
- Promote and raise public awareness of the use of modern biotechnology.
- Establish an information network related to the knowledge and importance of biotechnology.

Tourism (Eco-tourism)

Context:

The travel and tourism industry, frequently cited to be the largest and fastest growing industry in the world, plays a major role in the economies of many countries around the world. The Asian Development Bank recognizes the Greater Mekong System to be the fastest growing tourism destination in the world. With less than fifteen years experience in the industry, tourist arrivals to the Lao PDR increased from 14,400 in 1990 to 735,000 in 2002. Approximately 30% of arrivals are classified as “international tourists”, while the remainder are primarily “day-trippers” from neighboring countries. Income from all tourists amounted to US\$113 million in 2002, making the tourism industry the Lao PDR’s largest source of foreign exchange earnings – and one of the government’s eight priority development sectors.

Eco-tourism is often quoted to be the fastest growing sector of the international tourism industry. The Lao PDR is characterized by the high quality and status of its diverse natural and cultural habitats – resources upon which the eco-tourism sector depends. While this brand of tourism is very new to the Lao PDR, and there is a lack of detailed data, research suggests that over half of all arrivals are interested in the natural environment, while 67% are interested in cultural attractions. Estimates suggest that tourist interest in nature and culture currently translates into an annual contribution of around US\$53 million to the Lao economy. A UNDP award to the Lao PDR’s first eco-tourism project, in recognition of its contribution towards poverty alleviation, confirms the huge potential of the sec-

tor to deliver meaningful benefits to biodiversity and poverty alleviation objectives. Nine of the Lao PDR’s seventeen rural provinces are currently engaged in planning activities to develop and promote eco-tourism.

The development and promotion of a thriving eco-tourism sector will be dedicated to poverty alleviation and the conservation of the Lao PDR’s natural and cultural heritage. Measures and mechanisms will be put in place to coordinate, and where necessary, regulate the development of the sector to ensure that the benefits are maximized and the negative impacts minimized. The promotion of the sector will take place within the boundaries of pragmatic management, providing carefully targeted support to commercially viable public and private business enterprises that are sensitive to environmental and cultural needs. Support will also be provided through the coordinated provision of infrastructure and capacity building initiatives conducive to the supply of quality eco-tourism products and services that meet tourist needs and expectations.

Key Issues:

- Roles and responsibilities of key agencies are not clearly defined.
- The Lao PDR is new to eco-tourism and the tourism industry.
- Access to existing and potential sites is difficult and time consuming due to poor infrastructure including roads, accommodation facilities, restaurants and telephones.
- The majority of service provision is aimed at individual low budget travellers (FITs) and is of low economic value.
- A lack of experienced guides.
- A lack of experience and capacity in both the public and private sectors.
- Some of the rural communities and government staff lack knowledge, information and access to the industry.
- Inadequate mobilisation of domestic and international funds.
- Limited access to credit for investment.

Intervention Options:

- Strengthen capacity across the concerned sectors.
- Coordinate, guide and regulate the sector to achieve target objectives.
- Support public and private sectors to promote sustainable growth.
- Enhance eco-tourism development which is instrumental in poverty reduction for the local community.
- Strengthen institutional arrangements.

- Support environmental protection, nature conservation and cultural traditions.
- Provide socio-economic development for the host communities.
- Develop research and information.
- Establish an eco-tourism development plan at all levels.
- Develop infrastructure for eco-tourism sites.
- Encourage the private sector to invest in the industry.
- Link national eco-tourism into regional and international networks.
- Improve and identify new eco-tourism sites for each province.
- Support training, capacity building and good practice.

8 Mineral Resources (Art. 81, 14)

Context:

The Lao PDR is rich in mineral resources, precious metals, as well as rare earth and gemstones such as tin, coal, oil, iron, copper, gold, gypsum, zinc, chromium, lead and salt which offer potential for socio-economic development. Their exploitation however, is just in its infancy and the full extent of the reserves and their quality need to be established. Up to now prospecting has just been conclusive for gold, tin and lignite.

The current contribution of mining to the national economy is therefore still negligible as the sector only contributed 1% to GDP in 2000. The local environmental impacts from each mine are significant, and this will certainly become a growing concern with the expansion of mining operations in the country. There are also concerns that manual mining, which does not follow standard techniques and regulations, is having a negative impact on biodiversity.

The value of mineral production has also increased steadily over the past five years. The GoL has encouraged the private sector to develop mineral resources and in order to avoid negative impacts an environmental impact assessment system needs to be established for the mining sector. This system should clarify a regulatory body and subsequent tasks, and set out clear guidelines regarding environmental management for planning, design and operations.

Key Issues:

- Inadequate inter-sector co-ordination.
- Unregulated mining development leads to the destruction of forest cover, habitat fragmentation and the loss of species and areas of natural beauty.

- Mining activities are not subjected to a thorough Cost-Benefit Analysis, which would cover alternative uses.
- Inadequate environmental monitoring of mining operations.
- The use of chemicals in mining activities causes soil and water contamination.
- The exploitation and extraction process causes water, air and noise pollution.
- Some mining operations do not have an environmental recovery plan when negative impacts have occurred in an area during operations.
- Inadequately trained staff have difficulties in assessing the quality of plans and proposed mitigation whether environmental, socio-economic or macro-economic.
- Inadequate standards, measurement tools and funding for managing mining development.

Intervention Options:

- Promote economically sound and environmentally friendly mining.
- Increase the role of the environment in the sector.
- Develop a strategy on mining.
- Develop laws or regulations for managing and controlling the utilisation of chemical compounds in the mining sector.
- Develop and implement standard environmental and EIA regulations for mining measurement tools.
- Promote the use of Cost-Benefit-Analysis as a selection instrument for investments.
- Minimise the impact on biodiversity.
- Train personnel in the management of mineral resources.
- Establish an environmental fund through the income or benefits of related projects.
- Improve inter-sector co-operation.

9 Urban environment

Context:

Urban areas are experiencing higher population growth rates than the national average. Urbanisation is being driven by a combination of tourism, industrialisation, and rural migration to urban areas. Currently the scale and extent of urban environmental problems are very limited as population densities are low and industrial activities are in their infancy. Over 60% of households in provincial capitals have access to a reliable water supply, while 80-90% of the population in Vientiane and the larger towns are connected.

Key Issues:

- Urban infrastructure and services are basic and rudimentary.
- Low cooperation and co-ordination among relevant sectors and the public.
- A percentage of the urban population does not behave in an orderly manner, and insufficient regulations also lack strict enforcement.
- The urban population is increasing due to migration.
- Inadequate urban design, which lacks implementation, resulting in unplanned development.
- None of the urban centres (except Vientiane and secondary cities) are serviced by a standard sewerage system. Human waste disposal is not managed properly.
- Soluble and solid waste outputs are on the increase, as is the demand for waste removal services.
- The drainage systems are undeveloped, as storm water drains are generally not inter-connected.
- Several cities (except Vientiane prefecture and secondary towns) lack standard landfills. Existing landfills are largely uncontrolled with domestic, hazardous and toxic waste not being separated.
- Encroachment of agricultural land for other purposes.
- Unmonitored air and noise pollution from vehicles and factories due to the lack of monitoring equipment.
- A lack of motivation among urban dwellers to participate in public affairs.
- Untreated water is released into residential and public areas.

Intervention Options:

- Create clean and orderly green cities.
- Establish environmental standards for the control of air and noise pollution as well as for water quality.
- Improve the capacity of the cities' administrative agencies in relation to urban management, infrastructure development and urban services.
- Improve water and waste treatment.
- Develop urbanisation plans at district, provincial and regional levels which are closely related to environmental and urban heritage protection.
- Promote the participation of the public and private sectors in urban environmental management.
- Educate and enhance the public to recycle and reuse urban waste, namely compost, bio-fertilizer and bio-gas.

10 Public Participation**Context:**

Public participation is a process of clarification, communication and the collection of the opinions of all possible stakeholders, and the integration of such opinions into the decision making process for the feasibility of the project. Public participation also means the meeting of possibly affected parties and parties interested in the project during the review and approval process for environmental impact assessment/initial environment examination reports.

Public participation considers the requirements for the management, conservation and sustainable use of biodiversity, especially for projects, which may impact on biodiversity resources.

Implementation of public participation in accordance with guiding principles and processes will ensure that all relevant stakeholders, particularly affected ethnic groups have a full understanding of the proposed project and actively participate in the discussions and mitigation on biodiversity in that particular area.

In absence of public participation processes proposed projects will lack acceptance from the general public and stakeholders, and may cause considerable problems and delays with the completion of the project.

Key Issues:

- The majority of the Lao population is unclear of their role in the participation process during project development, as well as their use of and obligation towards the conservation and sustainable use of biodiversity.
- There has been an increase in socio-economic development, but some development projects have not consulted affected communities.
- Laws have come into effect without the issuing of specific regulations and guidelines regarding public participation.
- Public participation has increased the duration and costs of development projects.
- Participation of minority groups, the mass media, mass organisations, the private and public sectors, NGOs and other interested groups has been inadequate.
- In some cases, the compensation costs have not been discussed comprehensively with affected people prior to the project's commencement.
- Government agencies have not yet widely disseminated information concerning citizens' rights as well as their role and obligation in terms of public participation during project development.

Intervention Options:

- Encourage, promote and support public participation at all levels.
- Develop general and specific public involvement regulations.
- Promote public participation during the design and planning stages of socio-economic development projects.
- Ensure that public participation becomes an integrated principle for all natural resource management activities that focus on the sustainable use of biodiversity.
- Integrate and promote traditional knowledge of the local and indigenous people in the conservation and utilisation of biodiversity.

11 Public Awareness, Education, Training and Research (Art. 12, 13, 14)

Public Awareness and Education

Context:

Environmental education and awareness as well as biodiversity education and awareness are of utmost importance for the Lao PDR. The benefits of environmental management as well as the management, conservation and sustainable use of biodiversity need to be explained to the public, to the government, to the private sector, to mass organisations, to the mass media and to local people in particular.

Environmental education as well as biodiversity conservation issues have been incorporated into the curricula of common schools and vocational colleges in the Lao PDR. These curricula and teaching materials were developed by various organisations.

Attempts to raise environmental and biodiversity awareness have also been conducted in form of meetings, lectures on policies, strategies, laws and regulations. Other forms of dissemination include the publishing of information in the mass media namely in newspapers, magazines and posters as well as through radio and television broadcasts.

Key Issues:

- Low incentives for staff working in remote areas.
- Inadequate materials and means of educating and raising awareness.
- A lack of awareness and understanding of the importance of biodiversity among local communities and government staff.

- Insufficient numbers of professional staff are currently working in this field and there is therefore a lack of capable staff, as well as a lack of equipment and inadequate dissemination techniques.
- The education level of the majority of rural people has remained low and many are illiterate.
- Limited budget allocations to finance public awareness programmes and education development.
- The majority of people do not like to read.

Intervention Options:

- Enhance awareness and education regarding the significance of biodiversity resource conservation and its sustainable use.
- Increase public awareness and education by focusing on the government, as well as on the private and public sectors.
- Improve the communication process among all stakeholders.
- Disseminate the principles and targets of the CBD.
- Provide information on the status of biodiversity to the public.
- Create awareness among the younger generation both within and outside of the education system.
- Increase the number of qualified staff working in the field of education awareness, biodiversity conservation and management.
- Address gender issues in public awareness programmes.
- Upgrade the provision of education for people living in remote areas.
- Ensure that budget allocations for this field are put in place.

Training and Research

Context:

Biodiversity training and research has been conducted by different ministries and institutions in the Lao PDR, which have aimed at meeting their own specific needs. As for example, MAF's Department of Forestry which conducts training courses on wildlife survey and PA management, while STEA conducts courses in environmental impact assessment, public participation and public awareness.

The National University of Laos and other specialised research institutions related to various line ministries (e.g. LaRREC, NaFRI) basically conduct research activities in various thematic areas in order to principally provide information for their own management. There are exceptions, such as the Faculty of Natural Science who

have improved their curriculum with biodiversity related topics in order to meet the growing demand.

Specific biodiversity research in the Lao PDR remains limited and lacks a wider exchange of information between the government and the private sector. However, the government is increasingly aware of the importance of biodiversity and is taking steps to improve the situation. The government has established the National Biodiversity Centre (NBC) to coordinate biodiversity research and training. The NBC has been working to improve the curriculum of biodiversity training and research in the Lao PDR. The NBC has also been working to improve the coordination of biodiversity research and training among the relevant sectors. The NBC has also been working to improve the capacity of local experts in different fields of biodiversity and facilitate the concerned sectors to conduct research. The NBC has also been working to improve the coordination of research and training among the relevant sectors. The NBC has also been working to develop biodiversity training and research at a local and a university level. The NBC has also been working to establish a curriculum on biodiversity at the National University of Laos. The NBC has also been working to improve scientific knowledge both in country and abroad. The NBC has also been working to build the capacity and experience of staff through training and research both in the long and the short term. The NBC has also been working to create thematic specialists on training and research. The NBC has also been working to provide adequate funding for training and research activities both inside and outside of country. The NBC has also been working to develop a national training and research plan. The NBC has also been working to organise meetings to assess any training that is conducted, for each designated time frame.

Key Issues:

- Inadequate coordination among sectors to organise and conduct training.
- A lack of qualified training specialists and researchers in the field of biodiversity.
- A lack of training guidelines and education materials in Lao.
- Inadequate tools and materials for training and research.
- Training needs assessments have only been conducted for specific sector or institutional needs.
- A lack of incentives for researchers.
- Limited research capacity and experience.
- Limited budgets for training and research.

Intervention Options:

- Improve the technical capacity and experience of local experts in different fields of biodiversity and facilitate the concerned sectors to conduct research.
- Improve the coordination of research and training among the relevant sectors.
- Develop biodiversity training and research at a local and a university level.
- Establish a curriculum on biodiversity at the National University of Laos.
- Improve scientific knowledge both in country and abroad.
- Build the capacity and experience of staff through training and research both in the long and the short term.
- Create thematic specialists on training and research.
- Provide adequate funding for training and research activities both inside and outside of country.
- Develop a national training and research plan.
- Organise meetings to assess any training that is conducted, for each designated time frame.

- Set up an internal and external training and research network.

12 Legal and Institutional Frameworks (Art. 14)

Context:

The GoL's 5th Socio-economic Five Year Plan notes the importance of integrating environmentally sustainable development with socio-economic development, but has not included any specific measures to ensure implementation. STEA is in the process of finalising the National Environment Strategy (NES) up to 2010 and 2020, which also sets out the plan for the period from 2000-2005. Additionally it is revising and updating the National Environmental Action Plan (NEAP) to cover the period through to 2005.

As the country's economy and the rural poor depend primarily on natural resources, achieving the goal of poverty eradication will require maintenance of the natural resource base.

The Science Technology and Environment Agency was established in 1993. Its mandate covers the overall coordination and oversight of environmental affairs and environmental management throughout the country. STEA has also established offices in some Ministries, provinces, special zones as well as the capital city in order to discharge the same responsibilities at a regional level. These organisational and institutional settings have only recently been established and consequently lack experience and qualified staff. There is a clear need for future support in order to make this decentralised approach work. Since 1992, a number of laws, regulations and state decrees related to the regulation of natural resource management and economic development have been enacted. The Environmental Protection Law (EPL) was promulgated in 1999, which required all relevant government sectors to develop national and provincial environmental plans. Decrees have also covered an extensive range of environmental issues including natural resource management, pollution control, disaster management and cultural preservation. The Decree on the implementation of EPL has been in effect since 2001.

The National Environmental Action Plan, which was adopted in 1994, was the first comprehensive plan and up to now has been the guiding document for activities relating to the environment. The second comprehensive plan is at a draft stage and is currently subject to revision. The Provincial Environmental Action Plans are also under preparation and will be integrated into the provincial Socio-economic Plan.

The Regulation on the Environmental Impact Assessment issued in 2000, is a crucial instrument for the protection of the environment during the planning and execution of development projects. Sector guidelines have been developed for road and hydropower development projects and other instruments are also being prepared including public consultation guidelines, resettlement policies, an environmental fund, and a trust bond system.

The National Environmental Education and Awareness Action Plan is also being prepared with the goal of involving different social groups and stakeholders in environmental protection.

In addition to the above-mentioned legal framework, there are other laws, which have a bearing on environmental management, namely the Water Resources, the Forestry, the Mining and the Land Law.

The GoL has acceded international conventions such as the Convention on Biological Diversity (CBD), the Framework Convention on Climate Change (FCCC), and the Convention on Combating Desertification (CCD). It is Party to three additional global agreements namely the World Heritage Convention (WHC), the Vienna Convention for the Protection of the Ozone Layer (Vienna Convention) and the Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol). Furthermore it is Party to one regional accord, the Agreement on the Co-operation for the Sustainable Development of the Mekong River Basin (Mekong Agreement). The GoL additionally signed the Stockholm Convention on Persistent Organic Pollutants (POPs) on 5 March 2002 and the ratification process is reported to be underway. In the same year the Ministry of Agriculture and Forestry (MAF) submitted a recommendation for accession to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), to the Ministry of Foreign Affairs, which is currently under consideration.

The GoL is also considering to ratify the Cartagena Protocol on Bio-safety, and the Rotterdam Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC).

Key Issues:

- The roles and responsibilities of each sector are currently inadequately defined.
- National legislation and MEAs are not harmonised.
- Inadequate laws and regulations related to biodiversity.
- Existing laws and regulations are not strictly enforced.
- Each sector has different directions and policies.

- The current lack of sector-integration in the implementation of biodiversity related policies has resulted in an overlap in the implementation of biodiversity programmes.
- The level of awareness and understanding of Party policies as well as government laws and regulations varies considerably among government staff.

Intervention Options:

- Strengthen institutional co-operation and enhance inter-department co-ordination in the conservation and sustainable use of biodiversity.
- Develop and improve existing laws and regulations related to biodiversity and ensure their strict enforcement.
- Clearly clarify the institution responsible for implementation and its corresponding mandate.
- Implement tax policies relating to land, agriculture and forestry products.
- Resolve problems in mountainous areas, namely poverty, shifting cultivation and the settlement of shifting cultivators.
- Design a specific policy with privileges and apply regulations to the rural credit system focusing on low interest rates and financial sources.
- Develop regulations relating to the establishment and management of village development funds.
- Develop and promote privileges and incentives for Government staff working in priority upland areas.
- Develop policy and detailed regulations on the distribution of benefits from people's participation in forest management.
- Develop regulations relating to the processing of timber and NTFPs based on the agreement between the Ministry of Agriculture and Forestry and the Ministry of Industry and Handicrafts.
- Develop specific regulations for resettlement.
- Develop and apply criteria and indicators for the sustainable management of all forest types.
- Harmonise international conventions (MEAs) with existing laws and regulations.
- Promote mandatory environmental impact assessments of new development projects.
- Integrate biodiversity conservation and its sustainable use into macro sector planning.
- Increase dissemination of existing legislation to the general public.

13 International Cooperation and Collaboration

Context:

The Lao PDR is listed as one of the least developed countries but it still harbours abundant biodiversity resources. In order to ensure that this biodiversity is effectively conserved and used in a sustainable manner knowledge levels and capacity need to be increased and sufficient budgets need to be allocated.

Currently, the capacity and knowledge of Lao staff is inadequate to carry out their own technical research and to implement activities related to the management, conservation and sustainable use of biodiversity. There is therefore a need to co-operate at international, regional and sub regional levels, which includes assistance in the form of both technical and financial support.

External funds currently account for the main contribution to the state budget allocated for biodiversity activities. Sixty-two donors continue to support different programmes and projects focusing on the conservation and sustainable use of biodiversity, and between 1993 and 2003 these contributions amounted to US\$ 150 million.

Key Issues:

- Projects are too short and there is the need for continuity.
- Complicated approval procedures have been put in place which has resulted in projects being delayed.
- The Lao PDR needs to increase its actions in order to fulfil its obligations as a signatory party to international conventions and agreements.
- The public investment programme has only allocated budgets at a macro-level.

Intervention Options:

- Promote country needs driven sub-regional, regional and international cooperation.
- Increase regional and international cooperation through bi-lateral and multi-lateral agreements with mutual benefits.
- Promote long-term cooperation including the sharing of information and the exchange of experiences.
- Increase special co-operation with friendly and strategically important countries.
- Ease access of researchers and research institutions to donor funding in accordance with the country's laws and regulations.
- Improve the government staff's working knowledge of foreign languages at central, provincial, district and local levels.

14 Quality of Life and Poverty Alleviation (Art. 7 – 10)

Context:

It is estimated that about 83% of the Lao population or roughly 4.5 million people live in rural areas who depend on agriculture, livestock, fishery and NTFP collection for their livelihoods. According to national statistics 85.5% of the population are dependent on agriculture and fisheries as the basis of their livelihoods, regardless of whether it is for market production, subsistence or a combination of both. Official statistics also show that the agricultural, forestry and fishery sectors employ 97.5% of the national labour force at a subsistence level. Therefore natural resources are the nation's and the population's most valuable asset as they provide the basis for livelihoods, economic development and prosperity.

In the Lao PDR, as in other countries, links between ethnicity, the living area and the ways natural resources are utilized, can be identified. Populations and population segments interact differently with their respective physical environment. The environment shapes the production and farming system, and human intervention and the utilization of biodiversity shapes the environment. Thus, different ethnic groups living at different locations developed different land-use practices and patterns together with specific survival / livelihood strategies.

Environmental issues are part of a wider set of factors that contribute towards the perpetuation of poverty. There are many real opportunities for reducing poverty whilst at the same time protecting and improving the environment. Upland people – and in particular ethnic groups – are facing accelerated inequity in relation to the lowland population by having increasingly lower incomes in relative terms. Higher birth rates among ethnic minority people, in combination with a lower proportion of family members that contribute to cash incomes, reduce the per capita incomes even further in relation to lowland people.

Highland agriculture characteristically comprises of shifting cultivation in which farmers distribute crops over many pieces of land, using each plot for one or two years before moving on and returning after a period of five to six years. During the fallow period the land and forest are left to rest and regenerate. The ability to regenerate is dependent upon the species present, as some of them are able to regenerate, where as others are not. This age-old method which has been practised by the various ethnic groups was a natural way to preserve the forest and keep an ecological balance. However, in many cases the necessary fallow periods are shortening, thus not permitting the land to recover. In the Lao PDR, with a traditional fallow cycle of

15 to 25 years, the sustainability of this technique is in jeopardy when the density of the population exceeds 20 persons per square km.

Slow processes in forestland allocation may have been responsible for pushing ethnic minority people into a deeper dependency on the most degraded sloping lands. Land tenure of minority communities must be secured, and this requires an increased focus on the legislation of community-based resource management systems as well as the enforcement and monitoring capacity of forest and water laws. The potential opportunities of developing village-based cash flows from sustained yield forest management systems need further attention. In the upland areas environmental degradation is clearly evident. Unless measures are taken to stabilize the situation, livelihoods will become increasingly affected as the majority of households consist of subsistence farmers, who rely on natural resources for food production, as well as farm and live on land that is becoming less and less productive. Lowland resettlement as a potential solution needs to be carefully considered, because almost all of the farmers in these areas are upland farmers, and therefore unfamiliar with lowland farming techniques.

This was confirmed by the Poverty Alleviation Programme (PAP), which stated that members of the various ethnic minority groups make up the vast majority of the 35% of the population living below the poverty line. The PAP concludes further that poverty prevails among ethnic groups in upland areas due to disruptions in the fragile ecosystems, whereas poverty among the lowland population is mainly caused either by natural disasters or by the lack of access to paddy fields.

Traditional values, ancestral customs and production systems are deeply rooted and rural populations (as elsewhere) tend to be risk-averse. Changes in the traditional production system – even when they may contribute towards an improvement of living conditions – are often considered as risks, and therefore need a rather strong trigger such as disasters or very convincing economic incentives for people to adopt them. Supporting changes with written information is hampered by the often-low literacy rates among certain ethnic groups populating the upland areas, thus making it difficult for people to improve their living conditions.

Key Issues:

- The population's livelihoods and economic development relies on natural resources.
- Poverty is still widespread among rural populations.

- Access to safe water is still limited.
- Difficulties in providing public services such as education, health, clean water and markets to scattered populations living in rural and poor areas.
- Unequal development between rural and urban areas.
- A lack of arable agricultural land in most of the poverty-stricken areas.
- Deeply rooted life styles and customs among the poor are occasionally a barrier to innovation and change.
- The impact of the war including unexploded ordinance still creates difficulties for agricultural development.
- A low quality of food and medicine.
- Ineffective use of working hours.
- Inadequate local participation in the planning process and implementation of development activities.
- A lack of technical knowledge and funds for agricultural production.
- The limited size of the National Poverty Alleviation Programme budget.
- Poverty continues to be the single most important problem facing the Lao people.

Intervention Options:

- Ensure equitable benefit sharing from the development and conservation of biodiversity.
- Ensure the maintenance of diverse biodiversity as one key to poverty alleviation.
- Protect the current natural asset base of the poor.
- Improve and enhance technology and direct environmental activities so that they contribute towards poverty alleviation.
- Develop and promote income-generating activities for the poorer population.
- Enhance socio-economic development plans and policies that emphasise the sustainable use of natural resources.
- Ensure that the conservation of biodiversity results in the improvement of people's quality of life and alleviates poverty.
- Reduce the incidence of poverty to 50% of present levels by 2005 and completely by 2020.
- Strengthen and facilitate the participation of the poor in the decision making process.
- Protect the access the poor already have to critical resources.
- Expand the natural asset base of the poor through the transfer of ownership of natural assets to the poor.

- Tackle environmental problems and hazards that impact most upon the health and livelihoods of the poor.
- Promote the development of environmentally friendly private sector products and services.
- Provide access to alternative sources of energy for people living in remote areas.
- Encourage government agencies to shift to a more participatory style of management involving local people in resource conservation as well as production.
- Promote the production of goods, and use market based instruments and services where possible.
- Build staff capacity to ensure more effective environmental management.
- Update economic policies in order to protect the environment and to assist in alleviating poverty.
- Encourage public participation in, and action on environmental issues.
- Improve public access to environmental information.
- Increase the understanding of the strong link between poverty and environmental management.
- Ensure that gender issues are addressed in poverty alleviation programmes.

15 Development of Funding Sources

Context:

The benefits and costs of biodiversity conservation are distributed unequally between different groups. This acts as a major economic disincentive to biodiversity conservation; it also means that the groups who are responsible for conservation are often unwilling - or economically unable - to cover these costs. Unless the NBSAP is equitable in its impacts and effects, and especially targets the poorest and most vulnerable groups, it is unlikely to be either acceptable or practicable. The NBSAP's key aim should be to redress current imbalances in the distribution of biodiversity benefits and costs in the interests of conservation and economic equity.

Financial resources for biodiversity conservation are scarce, and effective implementation of the NBSAP will incur additional and wide-ranging costs to many different groups. Adequate and sustainable sources of finance must be generated as part of the NBSAP, and targeted to the groups who bear the major direct and indirect costs associated with biodiversity conservation. Key beneficiaries of conservation finance include both the central and provincial government.

The economic assessment as part of the BCR has highlighted the high and wide-ranging costs and funding requirements for biodiversity conservation in the Lao PDR. Raising funds to cover these costs is a major priority, as few financial resources for biodiversity conservation are available. It is also clear that the current costs of biodiversity conservation accrue mainly to the government (direct costs) and local communities (opportunity costs).

A financing strategy will form a key element of the NBSAP, including the provision of new and additional funding for biodiversity conservation from both domestic and foreign sources as stated in Article 20 of the CBD, and the strengthening of financial institutions as mentioned in Article 21.

Key Issues:

- The budget for biodiversity conservation is mainly based on international donors.
- The GoL's capacity and experience in access to international funding sources is still limited.

Intervention Options:

- Ensure that sufficient funding is made available for the implementation of the NBSAP.
- Clearly assess NBSAP-related costs, including both direct and indirect costs, and ensure that adequate funding sources are made available to cover these costs.
- Ensure that funds are targeted to the groups, sectors and activities that bear the direct and indirect costs of biodiversity conservation.
- Design NBSAP activities to minimise costs, and so that they are financially efficient in their operations.
- Obtain increased state budget allocations for biodiversity conservation activities.
- Raise additional state revenues that can be reinvested in conservation activities.
- Ensure increased foreign aid flows to biodiversity conservation activities.
- Develop prices and markets for biodiversity goods and services.
- Use innovative international funding mechanisms as a means to increase financial flows to biodiversity.