

**JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)**

**LAO PEOPLE'S DEMOCRATIC REPUBLIC
MINISTRY OF PUBLIC WORKS AND TRANSPORT
PUBLIC WORKS AND TRANSPORT INSTITUTE**

**THE STUDY ON IMPROVEMENT
OF WATER ENVIRONMENT
IN VIENTIANE CITY**

FINAL REPORT

Volume III: Data Book

SEPTEMBER 2011

**CTI ENGINEERING INTERNATIONAL CO., LTD.
IDEA CONSULTANTS, INC.**

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Volume II : Summary

Volume III : Data Book

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(As of 3 November 2010)

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LOCATION MAP

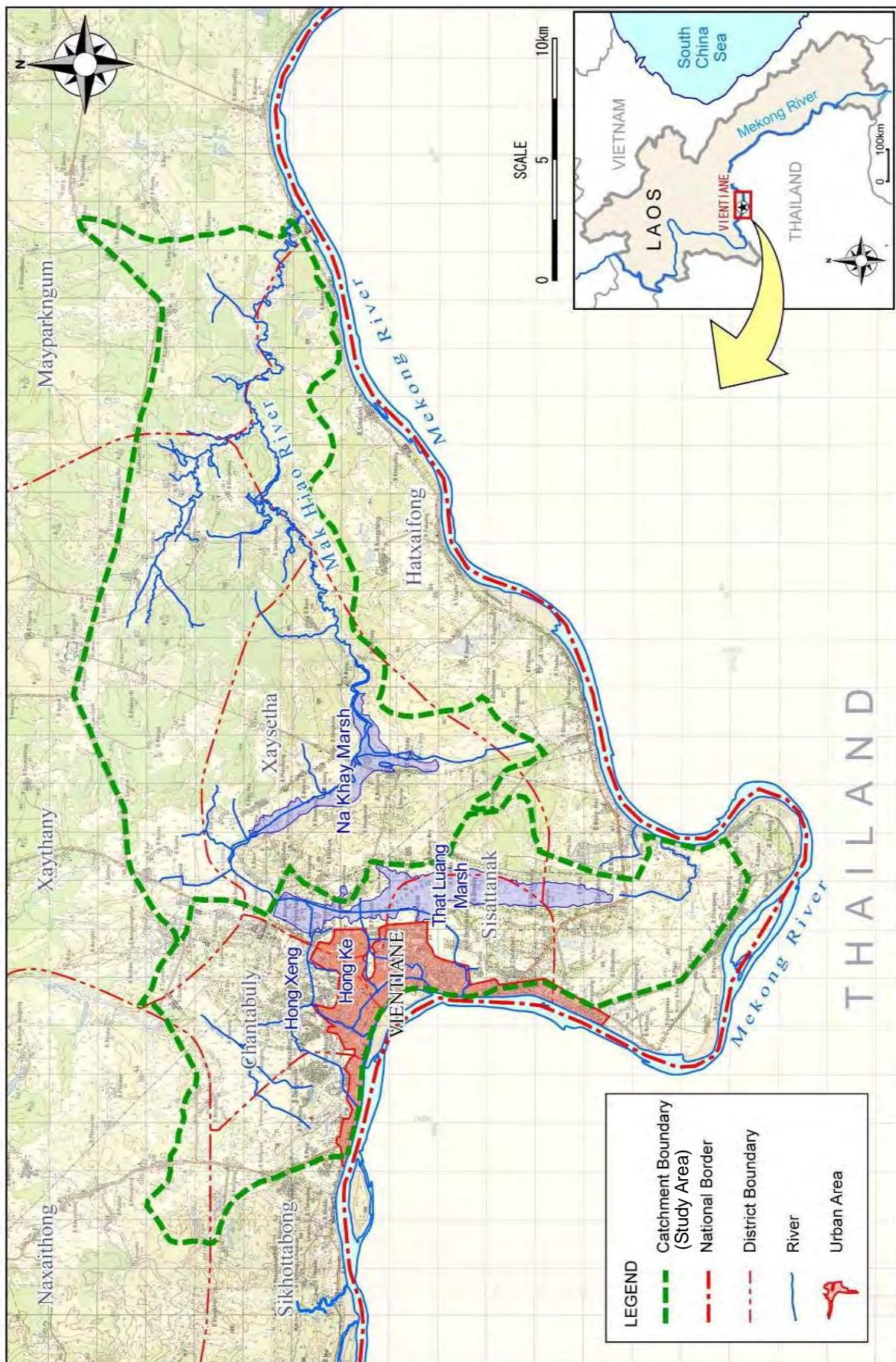


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ABBREVIATIONS

Organizations

ADB	:	Asian Development Bank
BORDA	:	Bremen Overseas Research and Development Association
CIDA	:	Canada International Development Agency
DANIDA	:	Danish International Development Assistance
DI	:	Department of Industry
DMH	:	Department of Meteorology and Hydrology
DOE	:	Department of Education
DOH	:	Department of Health
DPRA	:	Development Project Responsible Agency
DPWT	:	Department of Public Works and Transport
EDCF	:	Economic Development Cooperation Fund
EQMHCC	:	Environmental Quality Monitoring and Hazardous Chemical Center
EU	:	European Union
IEC	:	International Electrotechnical Commission
ISO	:	International Organization for Standardization
ITSUP	:	Institute for Technical Studies
IUCN	:	International Union for Conservation of Nature and Natural Resources
JICA	:	Japan International Cooperation Agency
LIRE	:	Lao Institute for Renewable Energy
MCTPC	:	Ministry of Communication, Post, Transport and Construction
MIC	:	Ministry of Industry and Commerce
MOE	:	Ministry of Education
MOH	:	Ministry of Health
MPWT	:	Ministry of Public Works and Transport
DHUP	:	Department of Housing and Urban Planning
DOR	:	Department of Road
PTI	:	Public Works and Transport Institute
MRC	:	Mekong River Committee
NEC	:	National Environment Committee
NRIES	:	National Research Institute for Educational Science
PPA	:	Pupils' Parents Association
SEED	:	Social Environmental Education and Development
SIDA	:	Swedish International Development Cooperation Agency
SRTM	:	Shuttle Radar Topography Mission
STEA	:	Science, Technology and Environment Agency (the former organization of WREA)
STEO	:	Science, Technology and Environmental Office (the former organization of WREO)
UN	:	United Nations
UNDP	:	United Nations Development Programme
UN-HABITAT	:	United Nations Human Settlements Programme
UNICEF	:	United Nations Children's Fund
UWSIP	:	Urban Wastewater Strategy and Investment Plan
WB	:	World Bank
WHO	:	World Health Organization
WREA	:	Water Resource Environment Agency
DOE	:	Department of Environment

WERI	:	Water Resources and Environment Research Institute
WREO	:	Water Resources and Environmental Office
WTO	:	World Trade Organization
WWF	:	World Wide Fund for Nature
VEU	:	Village Environment Unit
VUDAA	:	Vientiane Urban Development Administration Agency

Programs and Projects

EMSP	:	Environmental Management Support Project
NUDSIP	:	National Urban Development Strategy and Investment Plan
SEMII	:	Strengthening Environmental Management Project Phase II
WSP	:	Water and Sanitation Program
VIUDP	:	Vientiane Integrated Urban Development Project
VUISP	:	Vientiane Urban Infrastructure and Service Project

Technical Terms

BOD	:	Bio-chemical Oxygen Demand
B/C	:	Cost Benefit Ratio
CBS	:	Community Based Sanitation
COD	:	Chemical Oxygen Demand
DDT	:	Dichloro-diphenyl-trichloro-ethane
DEM	:	Digital Elevation Map
DEWATS	:	Decentralized Wastewater Treatment System
DO	:	Dissolved Oxygen
EA	:	Environmental Assessment
EC	:	Electric Conductivity
EEA	:	Environmental Education and Awareness
EIA	:	Environmental Impact Assessment
EMP	:	Environment Management Plan
ESIA	:	Environmental and Social Impact Assessment
IEE	:	Initial Environmental Examination
IESE	:	Initial Environmental and Social Examination
ORP	:	Oxidation Reduction Potential
QA/QC	:	Quality Assurance and Quality Control
SBS	:	School Based Sanitation
SIA	:	Social Impact Assessment
SMMP	:	Social Management and Monitoring Plan
SS	:	Suspended Solid
STP	:	Sewage Treatment Plant
TDS	:	Total Suspended Solid
TKN	:	Total Kjeldahl Nitrogen
WTP	:	Wastewater Treatment Plant

Others

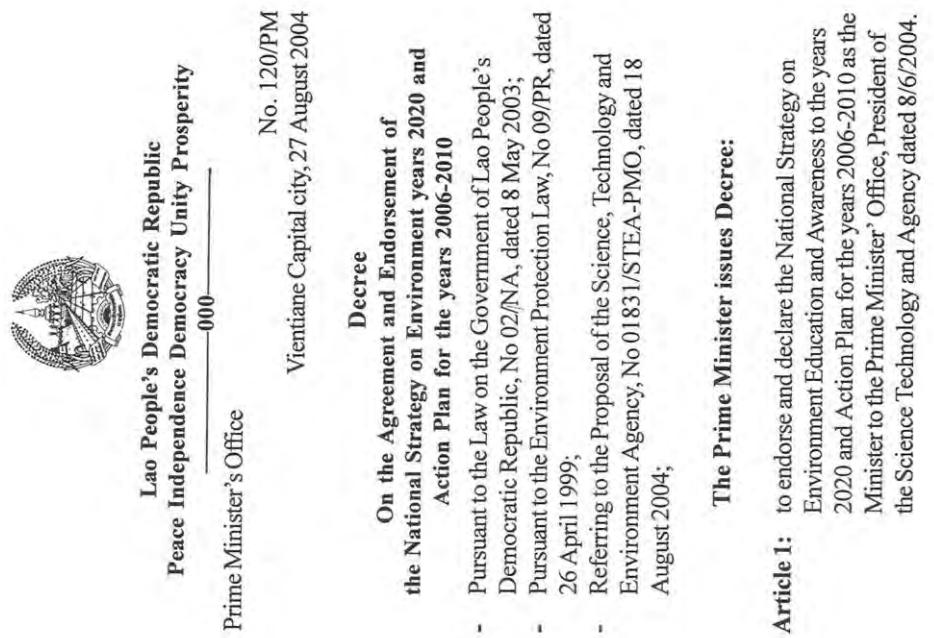
AP	:	Affected people
CD	:	Capacity Development
C/P	:	Counter
D/S, d/s	:	Downstream
ECC	:	Environmental Compliance Certificate
EEA	:	Environmental Education and Awareness

EL	: Environmental Law
EPF	: Environmental Protection Fund
EPL	: Environmental Protection Law
F/S	: Feasibility Study
FY	: Fiscal year
GDP	: Gross Domestic Product
GIS	: Geographic Information System
GPS	: Global Positioning System
GRDP	: Gross Regional Domestic Product
HIA	: Health Impact Assessment
HWWS	: Hand Washing with Soap
JOCV	: Japan Overseas Cooperation Volunteers
Lao PDR	: Lao People's Democratic Republic
MDGs	: Millennium Development Goals
M/P	: Master Plan
NGO	: Non-governmental organization
ODA	: Official Development Assistance
O&M	: Operation and Maintenance
PET	: Polyethylene Terephthalate
PDCA	: Plan-do-check-act
PI	: Public Involvement
PM	: Prime Minister
PO	: Project Owner
PPP	: Polluter Pays Principle
QA	: Quality Assurance
QC	: Quality Control
SEA	: South East Asia
SLSC	: Sub Least Square Criterion
SOP	: Standard Operation Procedure
STP	: Sewage Treatment Plant
TCP	: Teacher Children Parent
TOR	: Terms of Reference
TOT	: Training of Trainers
U/S, u/s	: Upstream
UV	: Ultraviolet
VEU	: Village Environment Unit
WQMNS	: Water Quality Monitoring Network System

CHAPTER 1. REGULATIONS AND INSTITUTIONS

1.1 National Strategy on Environment

Source: WREA



4. ແຜນການ ສັງເສີມການເຊົາ 2004-2005 ພຸກາຍພາກສ່ວນ ຮວມຂອງຫາກສ່ວນຫຼະກິດ ເຊົາໃນການປົກປ້າ ສັງຄາສີ່ງ ແວດໍລ້ມກໍຄົການນຳໃຊ້ຊັບ ພະຍາກອນທຳມະຊາດ ໃຫ້ ຢືນຢັງ	5. ແຜນການ ສັງເສີມການເລີ້ມ້ຳ 2004-2005 ເພື່ອ ແລະ ກະ ໃຫ້ຫຼາຍຂັ້ນ ແລະ ສັງຄົມ ໄຮຮານງົມຕົນສັງເວັດລ້ອມ ໃຫ້ຂັ້ມແຂງ	6. ແຜນການ ຈັດຕັ້ງປະຕິບັດ ສິນ 2004-2005 ຂອບຄະ ແລະ ທີ່ສັນຍາສົກນ ດ້ວຍສັ້ງແວດ ລ້ອມ
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ລັດຖະມົນຕີປະຈຳສັ່ນມັງກຽມກົດຕາມມີນີ້
ທີ່ວ່າງໆກົງການເວີຫະຍາສາດ ເຕັກໂນໂລຢີ ແລະ ສັງແວດລ້ອມ



- 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 onto force from the date it is signed. All regulation and rules that are abrogated.

Prime Minister

Signed and seal
Bounnang VORACHIT

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B

C



**Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity**

—000—
Prime Minister's Office
Science Technology
and Environment Agency No. 01631/STEA-PMO
Vientiane Capital city, 18 June 2004

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Decree
On the Agreement and Endorsement of
the National Strategy on Environment to the years 2020
and Action Plan for the years 2006-2010

**Chapter 1
Introduction**

The National Environmental Management Strategy is formulated to provide the general direction, targets, programmes and projects in relation to environmental protection to be implemented in short term and long term – up to the year 2020. The strategy is issued to enable the government's environmental policy and position in respect of environmental matters to be communicated. It also is issued to encourage

and foster the involvement and commitment of Lao people in the course of environmental management in line with the socio-economic development of the nation; to give impetus to the implementation of the Environmental Protection Law and other environment and natural resources related Laws.

It also serves the commitment of Lao PDR in its membership of regional and sub-regional Environmental Treaties and cooperative Agreements. The Environmental Strategy is also aimed at securing sustainable development, contributing to the poverty eradication and at improving people's livelihoods.

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

be reviewed and revised. This is to ensure it fully reflects any new changes, and for it to be in line with the reality of the national social-economic growth.

1. The State of Global environment

The planet we inhabit supports all life. Its health has a direct effect on the existence of all living creatures. The existence and growth of all countries has benefited from the planet's resources. Countries have also had an impact upon the planet we inhabit. It is in all of our interests to ensure that what supports us all is respected and cared for. All countries can contribute to the process of making this planet clean and healthy. It is therefore deemed necessary that all nations take responsibility to fulfil their obligation in protecting the environment and natural resources: this to ensure that the planet is stable now and in future. Without such international attention and cooperation the effects have the potential of harming us all.

2. The importance of the environment to the global living creatures and the natural ecosystem

Internationally, the environment is acknowledged as being the natural world, or environment, and the social environment. All of the elements that make up the environment both

2

3

natural and social are unable to exist in isolation. There is always an interaction or inter-relationship between the social and natural environments. If something is changed in one so the other also changes. This cause and effect relationship is important to understand, especially in respect of the natural environment. It is shaped by the complex interactions or inter-relationships between the social and natural, and therefore cannot be separated. This forms the complete ecosystem.

Worldwide best practice on the environmental solutions or environmental management requires to be sought out and shared. In the course of socio-economic development and environmental management of each country, the emphasis has to be put on the following:

- Introducing the benefits of a sound and sensitive environmental economy,
- Including important lessons about the consequences of socio-economic development and
- Setting out how we take care of our environment in a sustainable manner, whilst attempting to increase the people's quality of life.

3. State of environment and environment management at international levels

a) State of Global Environment

We are progressing into the new millennium, and human knowledge and technology is continually evolving, thus accelerating socio-economic development. However, due to the farreaching consequences of human interference we are facing escalating environmental degradation. At a global level this includes e.g. biodiversity loss (fauna, flora and genetic resources of key indigenous agricultural species, such as traditional varieties of rice and maize); contamination and depletion of water sources; land degradation; the rapid increase of the waste and toxic chemicals and climate change. These all severely affect human livelihoods and property. At the same time, the environment and natural resources have become fundamentally important, playing a crucial role in social and economic development, not least in developing countries where dependence on natural resources often is high.

These issues are global and seriously affect progress in both developed and developing countries. In response to this, all countries around the world have to increase their efforts to protect the global environmental heritage, and to manage the world's resources in a sustainable manner. Having recognised such a situation, Three World Summits on the environment have been organized. In the last World Summit, the implementation plans for the Agenda 21 was adopted and a financial mechanism for the Millennium Development Goals (see Box 1) was set up.

The dialogue, discussions and negotiations on global environmental issues will continue. The trend – as evidenced by the three Earth Summits is clearly and increasingly to emphasize sustainable development and the incorporation of environmental and social dimensions into the economic development plan of each country. It is equally clear that the move is from general policy statements to concrete actions.

Box 1. Millennium Development Goals

- Economic wellbeing
 - Reduce the proportion of people living in extreme poverty by half between 1990 and 2015

Social development

- Enrol all children in primary schools by 2015
 - Girls should have the same educational opportunities and treatment as boys in primary and secondary schools by 2015
- Infant and child mortality should be reduced by two thirds between 1990 and 2015
- The proportion of women dying as a result of child birth must fall by three quarters by 2015
- Access to reproductive health services for all by 2015

Environmental sustainability

- All countries to have national strategies for sustainable development by 2005 so as to reverse the negative environmental trends and loss of environmental resources by 2015

From “A Better World for All 2000”, by the United Nations, The World Bank, International Monetary Fund and OECD

Box 2. Main international environmental conventions.

- Agreement on the Sustainable Development of the Mekong River Basin (1995),
- UN Framework Convention on Climate Change of 1992)
- UN Convention to Combat the Desertification
- Convention on Biological Diversity of 1992),
- Convention on the World Cultural and Natural Heritage of 1972 (1997),
- Vienna Convention for the Protection of the Ozone Layer of 1985
- Montreal Protocol on Substances that Deplete the Ozone Layer of 1987
- Convention on Persistent Organic Pollutants
- Kyoto Protocol (2003)
- Basel Convention on the Transboundary Movement of Hazardous Waste of 1989
- Convention on International Trade in Endangered Species of Flora and Fauna (CITES) of 1973
- Ramsar Convention (on wetlands of international importance) of 1971

To enable governments to bind themselves to international cooperation, a number of multilateral environmental agreements (MEAs) have been developed and signed. Environmental Conventions form the main thrust of these MEAs, please see below for a list.

b) Regional Cooperation

There are many environmental issues of regional importance, such as shared water resources (e.g. subregional cooperation in the Mekong River Basin), forestry resources issues (forest exploitation and use), and wildlife trade. Lao PDR therefore participate in a number of regional organizations such as Mekong River Commission (MRC) and ASEAN, and also give prime attention to dialogue and exchange, on a bilateral basis, with the neighbouring countries such as P.R of China, S.R of Vietnam, the Kingdom of Thailand and Cambodia

This region as with other regions, such as The North Sea, where many northern European countries share a common sea area, requires agreement upon pollution control, fishery and mineral rights and extraction, among others, in order to guide care for the regions environment. The Danube River basin too is an example of transboundary cooperation by several European countries, all who share a common interest in preserving the health of the River whilst seeking to gain benefit from its existence. This is not unlike the situation of the Mekong.

4. Status of the Environment in Lao PDR

a) Status of the natural environment.
Lao PDR still has rich natural resources and good environmental quality. It is a strength for social and economic development. The status of the natural environment is as follows:

1) Land Resources

Land is the property of the National Committee, the State guarantee the right of use, procession and inheritance to its people according to the Constitution and Land Law. Eighty percent of the territories are mountainous and highland, and one third of landmass is greater than 30 degree inclination and only twenty percent is flatland. The landmass is divided into eight categories; agricultural, forest, construction, industry, communications, cultural, defense and wetland. Land area appropriate for cultivation totals 5.9 million hectares. The FAO (a branch of the UN) report of 2000 indicates that one percent of land is severely, eighty three percent medium and sixteen percent lightly degraded.

2) Water Resources

Lao PDR has rich water resources, mainly good quality fresh water. The amount of average water flow in the Mekong and its tributaries amounts to about 8, 500 cubic meters per second. It contributes 35% of all water flow through the Mekong basin. In the rainy season the flow is 80% of the total annual flow. Currently most of the water use occurs in the agricultural sector. For instance; irrigation,

fisheries, plantations and livestock watering. In addition the water is used for hydropower, the country has the potential to produce 23,000 megawatts of electricity. Currently only 5% of that capacity has been exploited. The plenteous supply of water in Lao PDR, especially in the rainy season, provides good condition for water transport, industrial development and water supply. Sixty percent of urban population and 51 % of rural population has access to clean water.

Currently there are some problems related to waste and polluted water in major urban areas from varied community use (residential density, hotels, hospitals and entertainments centers). In addition there is water pollution from agricultural and industrial sectors, including mineral exploitation. This is not a major problem now, but the problem could escalate. The degradation of natural water and water catchments from sedimentation, land erosion and drying out continues.

3) Forest Resources

The result of the forest survey, 1989 indicated that the territory of Lao has 47% of forested land area, or 11.2 million hectares. Forest is divided into five categories; production, conservation, protected rehabilitation and degraded areas. Lao PDR has twenty NBCAs, two buffer zones, 57 provincial biodiversity conservation areas and 144 district conservation areas, 23 provincial protected areas and 52 district protected areas. That makes the total protected area 5.3 million hectares or 22.6% of the national territory.

Forest resources play an important role in income generation for the nation, food and income sources for rural families. The forest cover has decreased because of agricultural development, forest fires, shifting cultivation, logging, infrastructure development and forest exploitation and collection of NTFPCs beyond the capacity of the natural regeneration of the forest.

4) Biodiversity

Lao PDR is the country that has rich biodiversity. There are at least 8100 different species of flora and fauna. That includes reptiles, amphibians (160 species), 700 of bird species and 11 mammal species. Eighty seven of fish species in Indochina are mainly found in Lao. One thousand three hundred wildlife species that have natural habitats along the banks of the Mekong and its tributaries. The forest of Lao is the centre of the origin of sticky rice, and it has 3100 rice varieties, ranking second in the world for such diversity. There are many varieties that exist that are unique to Lao. In addition Lao has a beautiful landscape that has potential for national socio-economic development. Nevertheless, some of the natural biodiversity are destroyed, such as forest resources. Plants, wildlife, birds and aquatic animals are threatened with extinction.

5) Mineral Resources

Lao PDR still has many unexploited mineral resources, including gold, precious stones, lead, coal or lignite, oil, iron ore, copper, limestone, zinc, salt and others are important for economic development. In the future mining

will increase and this may cause adverse impact upon the environment and society if sound environmental management and monitoring is not in place. If there is no reasonable use of the resources they will suffer depletion.

6) Natural, Historical and Cultural Heritage

Lao PDR has a long and distinguished history in SE Asia. It has beautiful natural features, such as water falls, caves and wellknown historical and cultural sites, for instance the Plain of Jars, Wat Phu in Champassak Province and the world heritage site of Luang Prabang. In addition there are other cultural sites, for example That Luang Stupa and ancient town planning in Vientiane, Champassak and Bokeo.

b) Status of the Social Environment

In general the social environment in urban settings is relatively good, although the rate of population growth is quite high. Increase in industry, tourism and general urbanization is leading to rapid urban development.

Public health services are quite basic and 40% of urban population has no access to a clean water supply. There is limited drainage and sewage systems, insufficient waste water treatment, insufficient solid waste disposal sites both for household and hazardous waste. In addition there is a lack of ambient quality and emission standards for noise, air and odorous pollution. The industrial and service sectors do not have proper mitigation measures to deal with solid waste and waste water from factories, hotels, hospitals, restaurants and others.

c) Status of Environmental Management

1) Policy and Legal Framework

The Government of Lao PDR (GoL) approved the action plan on tropical forests, 1989, the promulgation of the Constitutions, 1991, and the first Environmental Action Plan in 1994. Then the GoL have made much effort to develop policy, strategy and legal frameworks for the protection of the environment and conservation of natural resources. Implementation of these at the central and local level are taking place currently. Article 19 of the new Constitution, 2003 states that: "All individuals and entities shall protect the environment and shall preserve the natural resources, such as land, forests, wildlife, watercourse and the air, that form the basis of protection of the environment in Lao PDR".

In order to bring Lao out of being one of the least developed countries (LDC) and to industrialize and modernize, the GoL have defined the goal and objectives of socio-economic development strategy to 2020. The strategy emphasizes the importance of environmental protection "Socio-economic development should progress continuously and be stable, there should be balance between social, economic and cultural development and the protection of the environment, so ensuring sustainability".

After the promulgation of the Environmental Protection Law (EPL) in 1999, the decree on implementation of the Law was issued in 2001 followed by supplementary and

supportive regulations, for example the general Environmental Assessment (EA) regulations. They form the legal instruments for the management and monitoring of environmental protection activity of development projects and operations.

The EPL defines five basic principles on environmental protection:

1. Environmental protection shall be the priority consideration and environmental mitigation and restoration are considered less preferable, but also important activities.
2. The nations socio-economic development plan shall include provisions to protect the environment and natural resources.
3. All persons and organizations residing in Lao PDR shall have an obligation to protect the environment.
4. Whoever causes damage to the environment is responsible for its impact under the law.
5. Natural resources, raw materials and energy shall be used in an economical manner, which minimizes pollution and waste and allows for sustainable development.

In addition to the EPL there are other laws that have provision for environmental protection, namely: Forestry Law (11/10/96), Law on Water and Water Resources (11/10/96), Land Law (amended version 21/10/03), Law on Electricity (12/04/97), Law on Mining (12/04/97), Law on Road Transportation (12/04/97), Law on Agriculture (03/04/99), Law on Urban Planning (03/04/99), Law on

Roads (03/04/99), Law on Industrial Manufacturing (3/4/99), and Law on Hygiene, Disease prevention and Health Promotion (10/4/2001)

2) Institutional Structure and personnel

The Science, Technology and Environment Agency (STEA) was established in 1993.⁽¹⁾ It has role and mandate to manage environmental matters in the country, and to coordinate with other sectors at central and local level, the development of policies, strategies, and action plans on the environment. It helps to create conditions for other sectors and local authorities to establish environmental management and monitoring units (EMMUs). EMMUs have been established at provincial, municipal and special zone level. The National Environmental Committee (NEC) was established in 2002 by Prime Minister's Decree No. 9/PM to direct environment management and addressing environmental issues in a uniform manner. Provincial authorities established their own provincial environmental committees (PECs).

As mentioned above EMMUs have been established in all provinces and some important sectors. However, the capacity of personnel is limited and insufficient provision of facilities and equipment is available to enable them to perform their role and mandate.

3) Provisions of financial and technical supports

In the past provision of financial support from public and

¹ Decree on the establishment of the Science, Technology and Environment Agency (STEA), No. 63/PM, and decree on the establishment and activities of STEA, No. 68/PM, dated 12/5/1999.

private sectors, and from international organisations to environmental activity has been relatively limited. Staff have limited capacity, and the capacity building that exists is mainly based upon technical assistance from cooperation projects not on a systematic approach.

To ensure future provision of financial support to environmental focused work, it is important to establish the National Environmental Protection Fund (NEPF). This mechanism will mobilise financial sources from different sectors to support environmental protection, environmental mitigation and environmental rehabilitation. To develop and promote the use of economic instruments that, for example: environmental guarantees, fee and penalty for environmental work. The GoL should allocate budget and seek assistance from donor countries and international organisations on the basis of international cooperation and multilateral and bilateral agreements.

4) International and Regional Cooperation

International cooperation is a crucial factor in the support of environmental management and to meet the goals and objectives started in the national policy. Lao PDR has signed several international conventions on the environment, namely:

- UN Framework Convention on Climate Change, 1995
- Convention on the Desertification, 1996
- Convention on Biodiversity, 1996

- Vienna Convention on the Protection of the Ozone Layer, 1998
- Convention on world Cultural and Natural Heritage, 1987
- Agreement for the Development of the Mekong River basin, 1995

The participation of Lao PDR in environmental conventions provides opportunities for the country to cooperate with the international community in the protection of the global environment. It also provides opportunity to the nation to seek financial and technical assistance to support environmental protection activities to ensure sustainable development.

Lao PDR has made efforts to implement its international obligations under international legal frameworks. For example: UN Agenda 21, ASEAN Action Plan on the Environment and Sustainable Development, and the Environmental Action Plan of the Mekong River Commission (MRC).

There have been many capacity and training programmes provided to staff of GoL. The training has been organised to provide environmental knowledge to participants. Some selected government officials have been sent on study tours and long term academic study.

Environmental Education and Awareness is implemented by using different approaches. For example: seminars, public

campaigns, training workshops at central and local level. There is a public campaign on the environment organised on important days, study visits and study tours within the country and overseas have been organised and carried out. The GoL promotes public and private sectors to participate in environmental protection activity contributing to their objective and sustainable exploitation and use of natural resources; and to prevent and mitigate pollution, waste and waste water. It is also important to promote citizens that are able to fulfill their obligations to protect the environment.

d) Environmental Assessment

Currently the environment of Lao PDR is not severely degraded and there is not many environmental problems. The existing environment issues include:

- There is limited land area is used for agriculture and other sector development. Only 1% of the land is degraded. The causes of land degradation include logging without proper planning, unprofessional approaches to land use, shifting cultivation, using chemicals and fertilisers in agriculture, existence of unexploded ordinance (UXO) and yellow rain from Indochina.
- Hydropower development and construction of transmission lines play and important role for socioeconomical development. Although hydropower provides clean energy, the lack of Environmental and Social Assessments and appropriate mitigation measures may lead to severe impact. For instance: impact to the location near the development project, impact to biodiversity, ecosystem and forest cover.
- During 1990 the forest cover of Lao PDR is 47% of 11.2 million hectares. The forest cover continues to decrease causing impact upon forest systems; flora and fauna and their interrelationship.
- Industrial development has been improved in the last five years. The number of factories has increased, rural population has moved to urban settings looking for employment opportunities, this causes environmental impact. For instance; waste water increase and other environmental impacts.
- The survey and exploitation of mineral resources has been quite successful. However, there are some problems. For example; the survey and exploitation of resources is not carried out in a professional manner, lack of financial means, proper regulation and other important factors that make the prevention and mitigation of environmental impact difficult. It can be seen that some mining operations have caused adverse impact to the environment. Although the country has a Mining Law and an Environmental Protection Law, the surveying for exploitation, operation and closure of the mines still causes environmental problems.
- Urban and infrastructure development have increased. In addition to these developments, there are also adverse impacts to the environment. For instance; loss of agricultural and forest land from road, irrigation, residential and other related development. The construction of services infrastructure; for example water supply, drainage systems, waste

Chapter 2 Environmental Strategy to the Year 2020

1. Vision

- water treatment facility and waste disposal sites are not carried out in an appropriate manner. Insufficient consideration of the impact upon society and the environment, weak implementation and enforcement of law and regulation by project operators and enforcement authorities, and lack of real sanctions against wrongdoers. In addition, there are other environmental problems such as air, noise, odours, in part caused by poorly maintained and/or cause concern old vehicles among other causes.
- The public has limited knowledge and understanding of environmental issues, private and business sectors have not participated actively in environmental management.

In summary Lao PDR does not have many environmental problems like other countries. However, in the future, socio-economic development and the use of ineffective production will lead to natural resource reduction and the increase of waste. That may cause adverse impact to the natural and social environment if there are no preventative and mitigating measures put in place. Therefore, all are encouraged to protect the environment, preserve nature and ensure reasonable use of natural resources.

1. Environmental management in the country should be implemented in a systematic and effective manner to ensure environmental protection and natural resource conservation.
2. Environmental management should be well balanced with economic, social and cultural development and parallel with national defence and public security.
3. Environmental management should go hand in hand with the development of policy, strategy, legal framework, institutional reform and capacity building.
4. Environmental management should go hand in hand with environmental education and awareness in order to encourage public understanding and participation in environmental protection, mitigation and rehabilitation.
5. The establishment of financial mechanisms and promote investment in environmental activity.
6. The use of the strong environmental position of the country to seek opportunity for international coordination and cooperation.

2. Goals

To ensure proper environmental management and sustainable use of natural resources, national dissemination of environmental education and awareness, such that the

public understand policy, strategy, the law and different measures in order to allow participation in informed environmental management. All development projects and operations shall have social and environmental assessment. International and regional cooperation should be strengthened.

3. Objectives

In order to achieve the vision and goals, the following strategies should be implemented:

1. To implement policies to ensure valuable environmental resources are conserved in order to permit socioeconomic development, a sustainable environment and sustainable development; and the improvement of the livelihood of the people of Lao PDR.
 2. To protect the rich and valuable forest resources: to preserve the natural environment and ecosystem to ensure sustainability of provision of agricultural and forestry development contributing to continuous national economic improvement.
 3. To manage water and water resources to ensure multipurpose and sustainable use and equal access for the general population; and to provide resources for the development of other sectors.
 4. To develop and promote the use of land to ensure rich biodiversity in order to facilitate production for domestic, market and export use.
 5. To develop and promote environmental and social
- assessment in agricultural, industrial, mining, infrastructure and urban development projects. To promote the use of clean technology and public participation in environmental activity with the aim to make the country clean, green and fresh. To take measures that prevent the adverse effects of natural phenomena by the establishment of a rescue unit and a system for early warning.
 6. To protect and restore natural, historical and cultural heritage, sound and ethical traditional practices of the ethnic communities to promote the development of tourism.
 7. To participate and involve sustainable development processes at international and regional level, and to fulfill national obligations under international obligations and agreements.
 8. To develop and promote environmental education and awareness in order to create the conditions for international, regional and national cooperation.

Chapter 3 Action Plan for the 2006-2010

a) Goals and Objectives

To develop and improve instruments and the foundation for environmental protection by creating policy, strategy, legal framework and other measures for national environmental management. To establish EMMUs and provision of sufficient staff to enable the units to operate effectively. To integrate environmental study into formal and nonformal education, including vocational training; and to raise public awareness on environmental matters; and promote public participation in environmental management.

b) Priority Programs

1. To create policy, strategy, legal framework and other measures to manage the environment, conserve natural resources, and to take measures to prevent the adverse impact of natural phenomena.
2. To reform institutions to ensure their appropriateness for effective environmental management and monitoring. For instance the establishment of EMMUs at ministerial, provincial and district levels. To develop and improve capacity for central and local level government staff.

c) Focused Programs

- In order to ensure environmental activities proceed according to the goal and objectives provided in the NES, 2020 and 2010, the focus programs are defined as follows:
1. To manage and utilise natural resources in a reasonable and sustainable manner to ensure high benefit from the use of land, water, forest, mineral resources and biodiversity.

2. To promote the use of environmental and social assessment, the use of clean technology and systematic environmental inspection for urban and infrastructural development projects, including industrial manufacturing and medium and large scale projects.
 - Sustainable management of forests
 - Management and efficient use of mineral resource
 - Management and sustainable use of biodiversity
 - Management to prevent and control adverse impact from natural phenomena.
3. To strengthen and capacity build institutional frameworks and people in charge of environmental management and monitoring.
4. To encourage and promote the business sector's involvement in environmental protection, restoration and sustainable use of natural resources.
5. To develop financial mechanisms in order to promote and enable individuals and legal entities to contribute to the NEPF.
6. To strengthen international cooperation the area of the environment.

Action 1: sustainable land use

1. To develop a master plan on the management and utilization of land in NBCA, agricultural, industrial, urban and cultural, historical and natural sites;
2. To develop policy, strategy, laws and regulations; to promote agricultural production in high land; to emphasize the implementation of land allocation program; attempt to stop shifting cultivation; to reform village setting in accordance with local conditions and traditional practice of high land population; and to ensure local participation in the development of land use and land allocation programs;
3. To develop legislation to deal with conflicts or disputes arising from the land use;
4. To develop and promote study of agricultural systems that are appropriate to livelihood practice of high land and flat land population
5. To promote the use of technology that has minor

Focused Program No 1: The Management of Natural Resources. (E.g. land, water, forest, mineral resources and biodiversity)

Focused program 1 includes six actions.

- Sustainable land use
- Sound management and sustainable use of water resources

- impacts to human health and quality of the soil in agriculture;
- 6. To promote organic production and to find markets for the products; and to undertake environment assessment on the impacts of development projects and operations on agricultural land;
- 7. To conserve local genetic resource and traditional species: for example, rice varieties that are appropriate to land conditions that have potential to support economic development;
- 8. To promote and support industry to reduce and minimize pollution, toxic and hazardous waste;
- 9. To undertake surveys, assessments and evaluations of the impacts from UXOs, and yellow rain from the Indochina war, on human health and soil quality;
- 10. To develop and promote the use of traditional knowledge on the management and utilization of land in accordance with specific local conditions in order to develop regional and national appropriate technology.

Action 2: Sound management and sustainable use of water resources

- 1. To develop a master plan on management and utilization of water and water resources by defining water course, watershed, water catchments, river, stream, lake, wetland and underground water areas;

- 2. To implement policy, laws and regulations, strategy and action plan on water and water resources;
- 3. To develop legislation to deal with conflicts or disputes over ownership and use of water and water resources;
- 4. To develop and promote a study mechanism on the use of water and water resources;
- 5. To promote the use of technology that has minor impacts on water and water resources; and to establish waste water treatment facilities for agricultural, industrial, and service projects and operations;
- 6. To develop guidelines for the management of water and water resources.

Action 3: Sustainable management of forests

- 1. To implement policy, laws and regulations, and national forestry strategy and action plan;
- 2. To prioritize the use of forest land at national, provincial, district and village levels into: protected, conservation, production, rehabilitation and degraded forests;
- 3. To develop and promote the use of sound traditional practice on the forest management by local communities.

Action 4. Management and efficient use of mineral resource

1. To implement policy, and to implement law on mining and develop a master plan on the management and use of mineral resources;
2. To develop legislation to deal with conflicts or disputes arising from the use of mineral resources;
3. To promote the use of technology to reduce impact on the health of people and the quality of the environment in mining operations; and to ensure there are waste water treatment facilities in mining operations.

on the management and utilization of biodiversity resources: for instance: inventory undertaking, selection and library of seeds, research for agricultural and handicraft production in order to develop local technology;

6. To promote the study of the potential and strength of biodiversity to support national socio-economic development and eco-tourism.

Action 5. Management and sustainable use of biodiversity

1. To develop and implement policy, laws and regulations, strategy and action plans on biodiversity and biosafe technology;
2. To develop regulations on the protection of local genetic resources and equal benefit from the sharing and use of these resources;
3. To undertake an inventory of plants, animals, insects, organisms with a focus on species that can be used in agriculture and herbal medicine;
4. To monitor and report the state of national biodiversity resources regularly;
5. To develop and promote the use of traditional knowledge and good practice of local communities

Action 6. Management to prevent and control adverse impact from natural phenomena.

1. To develop policy and a master plan to prevent and control adverse impact from natural phenomena;
2. To establish and improve capacity of provincial, district disaster control committees, define focal points and establish rescue units and early warning systems, especially in major urban settings.

Focused program 2:

Management of environment of urban, infrastructure, industrial and handicraft, special zone, free trade area, tourist development projects and operations including national, cultural and historical sites.

This focused program includes 5 actions:

Action 1: Environment management in urban development

1. To implement policy and law on urban planning and the master plan of the Urban Development and Administration Authority in order to allocate land to industrial, green zones and areas for historical and cultural conservation. To improve water and the clean water supply system, and to develop treatment facilities for solid waste and waste water, including hazardous waste from hospitals and chemical industries;
2. To promote the implementation of the Environmental Protection Law, the general environment and social assessment regulations; to monitor and inspect environment quality and other sectoral laws to ensure good environmental quality in urban settings;
3. To prevent waste littering and disposal of waste on road sides, public places, and river banks;
4. To promote the reuse of waste by the business sector.

Action 2: Management of environment in infrastructure development

1. To implement policy, laws and regulations, and to develop sectoral master plans in order to minimize and mitigate adverse impacts to society

and the environment; especially to implement environment assessment regulations, environment quality standards and emission standards; and to undertake environment assessment and inspection on roads, bridges, harbours, and agricultural projects and operations (including medium and large scale irrigation projects).

2. To develop and implement environment and social assessment regulations for roads, bridges, and harbour sectors.
3. To develop and implement guidelines on environment quality monitoring for roads, bridges, and harbour sectors.

Action 3: Management of the environment in industry and handicraft sectors

1. To implement the Environmental Protection Law and other laws and regulations on environmental protection, regulations on environmental and social assessments, and action plans on monitoring of the quality of the environment;
2. To develop and promote the use of clean technology and clean products, organic products or chemical free products, goods and services that conform to high environmental quality standards;
3. To develop and promote the use of new energy and renewable energy based on the local and regional conditions.

Action 4: Management of environment in special economic zone and free trade areas

1. To implement the Environmental Protection Law and other laws and regulations on environmental protection, regulations on environmental and social assessments; to implement the law on hygiene, decease prevention and health protection; the master plan of the Urban Development and Administration Authority in order to define urban land into residential, industrial and green areas, including provision for cultural and historical conservation sites;
2. To develop and implement environment management plan in parallel with the development and implementation of the strategic plan on the development of special economic zone and free trade areas.

Focused program 3: Institutional reform and capacity building for environment management and monitoring

This focused program includes 8 actions:

Action 1: Policy and legal framework

1. To develop and implement a strategy and action plan, and laws and regulations related to environmental protection: for instance National Environmental Strategy, provincial environmental strategies, the Environment Education and Awareness Strategy and Action Plan, Forest Strategy and Action Plan, National Strategy and Action Plan on Biodiversity, strategies and action plans on agriculture and water and water resources. To develop and implement environmental quality standards, and seek new alternatives for people, and promote public participation in development process;
2. To develop and implement effectively the Environment Protection Law and other related laws and regulations according to the unique and special conditions of the location;
3. To develop and implement supplementary and supporting regulations to the Environmental Protection Law: for instance environmental quality standards and emission discharge standards.

Action 5: Management of environment for tourist development in natural, cultural and historical sites

1. To develop and implement a strategy and action plan on cultural, historical and eco-tourism;
2. To implement laws and regulations related to environmental protection, regulations on environmental and social assessments, and regulations on cultural, historical and eco-tourism;
3. To develop and implement a management and restoration plan on heritage conservation sites.

Action 2: Institutional aspects

1. To undertake preparation to upgrade the government environmental sector to match that enjoyed by countries internationally;
2. To establish provincial environmental committees in all provinces;
3. To continue to support and develop capacity of EMMUs at central, provincial , district, and village levels;
4. To strengthen cooperation and coordination network nation wide.

Action 3: Personnel aspects

1. To develop and implement a national environmental training program;
2. To develop an environmental training kit appropriate to the Lao situation;
3. To develop and strengthen the coordination mechanism for environmental training, and continue to provide capacity building to environmental technical staff throughout the country that includes:
 - a) Environment management, especially natural resource management and urban environment management;
 - b) Environment and social assessment;
 - c) Environmental monitoring and inspection;
 - d) Environment data base development;

Action 4: Environmental and social impact assessment

1. To develop, revise and implement the general EA regulations and sectoral specific EA regulations, including other regulations and guidelines for the development of hydropower, mining, industrial, agricultural, irrigation, fishing, resettlement projects and compensation and public participation matters related to development projects;
2. To reform and strengthen coordination and cooperation mechanisms on environment and social assessment;
3. To develop regulations and guidelines on the issuing of environmental certificates.

Action 5: Environmental quality monitoring mechanism

1. To develop and implement a national environmental quality monitoring plan;
2. To develop detailed regulations and guidelines for environmental quality monitoring (soil, water, air, and biodiversity quality), especially for hydropower, roads, agricultural, mining, and chemical sectors;
3. To improve and strengthen the coordination mechanism on environmental quality monitoring;
4. To continue the improvement and strengthening environmental laboratories.

Action 6: Environmental information

1. To establish and implement an action plan on the management of environmental information nationwide;
 2. To develop and disseminate a report on the state of the environment at national and provincial levels including concerned environmental issues;
 3. To develop and improve the coordination mechanism on environmental information nationwide.
2. To carry out research on:
- a) the use and transfer technology for pollution prevention and control;
 - b) protection, exploitation, and utilization of natural resources to ensure sustainable development and effective economic development;
 - c) the use of good traditional practice (for example: knowledge and description of traditional medicines) for development of local technology for the protection of the environment.
 - d) the linkage between the environment and development and poverty alleviation.

Action 7: Environmental education and awareness

1. To develop and implement the National Strategy and Action Plan on Environmental Education and Awareness ;
2. To develop and support environmental education in formal and non formal education systems;
3. To develop and improve environmental education and awareness programs for local community in accordance with specific conditions of concerned locations;

Action 8: Environmental scientific and technological research

1. To develop and implement a national action plan on environmental scientific and technological research;

Focused program includes:

1. To support the business sector in their adoption and use of cleaner technology and production methods; to strengthen the management on the import and use of hazardous chemicals, including

minimizing the use of chemicals; and to implement national and international laws and regulations on environmental quality standards;

2. To promote the use of environmental friendly production processes across the business sector and to promote the use of established trade marks such as "organic product" to guarantee the quality and uniqueness of the goods in the international markets;
3. To promote business sector involvement in environment service provision.

Focused program 6: Strengthening regional and international cooperation

1. To continue to improve regional and international environmental cooperation, especially with neighboring countries, ASEAN members, Mekong region countries and international organisations in order to ensure good cooperation to deal with transborder environmental issues and the protection of the environment;
2. To implement national obligations under international conventions and agreements as an active member.

Focused program 5: Promotion investment and establishment of financial mechanisms for the environment

This focused program includes:

1. To promote investment in environmental protection activities by the business sector and individuals, domestic and foreign: for example: investment in waste water and solid waste treatment and disposal facilities, tree plantation programs, erosion prevention projects and rehabilitation of environmentally degraded areas;
2. To establish national, sectoral, and provincial environmental protection funds;
3. To allocate a specific government budget for environmental management

Chapter IV Implementation measures

To ensure effective implementation of the goals, strategies and objectives mentioned in the National Environmental Strategy, the following implementation measures have to be monitored and evaluated:

1. The National Environmental Committee has responsibility to develop, manage, and monitor the implementation of environmental activities in order to ensure those activities are carried out in accordance with the national social economic development plan of the Government;
 2. STEA has direct responsibility in the dissemination, provision of guidance to sectoral agencies, and local authorities for them to translate this strategy into sectoral strategies and implementation plans in accordance with their roles and responsibilities;
 3. To ensure all sectors and levels participate in the environmental protection, it is crucial to develop and train managers, and technical staff at central and local level in accordance with human resource development plan of the government;
 4. Ministries, ministerial equivalent agencies and provincial authorities (Vientiane Capital City and Special Zone) have responsibility to translate this strategy into programs, projects and detail activities for implementation;
 5. The Government will allocate an annual budget for environmental management. In addition, the Government will try to seek other financial resources from public
6. Line ministries, ministerial equivalent agencies, provincial authorities shall establish their EMMUs to monitor and inspect the implementation of their environmental strategy, action plan, programs and projects; and laws and regulations on the protection of the environment and conservation of natural resources. STEA should cooperate and coordinate with organisations mentioned above;
 7. Preparation of the implementation of the Action Plan from the year 2006 to the year 2010, and the detailed plan which should be developed for the year 2004 – 2005

5.	Development of plans on investment promotion and establishment of financial mechanism	2004-2005	CPC and MF
6.	Development of plan to implement international environmental conventions and agreements	2004-2005	STEA and MFA

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Activities that need to be implemented

No	Activity	Time-frame	Responsible Agencies
1.	Development of action plan on sustainable natural resource management	2004-2005	All sectors
2.	Environment management plans for urban, infrastructure, industrial and handicraft, special economic and free trade zone, and tourist development projects including management plans on cultural, natural and historical sites	2004-2005	M C T P C, MIH, MAF, MC, MIC, NTA
3.	Development of action plan for institutional strengthening and capacity building	2004-2005	STEA and Department of public administration and civil service
4.	Development of plan to promote private sector to participate in environmental protection and sustainable use of natural resources	2004-2005	All sectors