Sector Working Group on Uplands Development

Northern Upland Sustainable Development Programme (NUSDP)

Design and Feasibility Study for the Core Coherent Programme (CCP)

Report on Environmental Issues
DRAFT FINAL

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Abbreviations and acronyms

DAFO	:	District Agriculture and Forestry Office
DSNUSD	:	Diagnostic Study on Northern Uplands Sustainable Development
DWREU	:	District Water Resource and Environment Unit
EIA	:	Environmental Impact Assessment
ESIA	:	Environmental and Social Impact Assessment
FAO	:	Food and Agriculture Organization
FDI	:	Foreign Direct Investment
GoL	:	Government of Lao PDR
ICBL		International Campaign to Ban Landmines
IEE	:	Initial Environmental Examination
IUCN	:	The World Conservation Union
MEA		Multilateral Environmental Agreement
MCTPC		Ministry of Communication, Transport, Post and Construction
MOU	:	Memorandum of Understanding
NGPES		National Growth and Poverty Eradication Strategy
NPA	:	National Protected Areas
NSC	:	National Statistics Centre
NSEDP		National Socio-Economic Development Plan
NTFP	:	Non-Timber Forest Product
NUCCP		Northern Uplands Core Coherent Programme
NUSDP	:	Northern Uplands Sustainable Development Programme
PAFO	:	Provincial Agriculture and Forestry Office
PWREO	:	Provincial Water Resource and Environment Office
REDD		Reduced Emissions from Deforestation and Forest Degradation
SEM II	:	Strengthening Environmental Management, Project Phase II
SIDA	:	Swedish International Development Agency
STEA		Science Technology and Environment Agency
TA		Technical Assistance
TOT	:	Training of trainers
UNEP	:	United Nation Environment Programme
UXO	:	Unexploded ordnance
WB	:	World Bank
WCS		Wildlife Conservation Society
WEPA	:	Water Environment Partnership in Asia
WREA	:	Water Resource and Environment Agency
WWF		World Wildlife Fund

1. Introduction

1.1. The programme and context

The objective of the Northern Uplands Core Coherent Programme (NUCCP) is: “secured and improved livelihoods of the rural poor in selected areas of the northern uplands based on sustainable land and natural resource management and community driven development”. The Northern Uplands include 8 northernmost provinces of Lao People’s Democratic Republic (Lao PDR): Phongsaly, Luang Namtha, Bokeo, Sayabury, Luang Prabang, Oudomxay, Huaphan and Xiengkhouang. This mountainous region with steep slopes and very little flat land is characterized by a diversity of ethnic groups, farming systems and ecosystems.

The Lao PDR is experiencing rapid growth and change. In 2006, the Northern Uplands registered a GDP growth rate of 10.18% compared to a national figure of 8.27% (DSNUSD 2008). However this high rate is due mainly to the growth in Luang Prabang (25.9%) and Oudomxay (12.7%) as the remaining provinces registered a growth of 7.14% which is lower than the national average.

The Diagnostic Study on Northern Uplands Sustainable Development identified three main drivers of change: "investment and regional trade, implementation of GoL programmes supporting the 6th National Socio-Economic Development Plan (NSEDP), and development in related sectors such as mining and hydropower". These developments occur in all provinces of the Northern Uplands and pose a real challenge for the environment.

Unsustainable extraction of wildlife and other Non-Timber Forest Products (NTFP) either for food or for sale has become a threat to biodiversity. Farmers report that they have to travel deeper and deeper in the forest to find wild orchids or animals of commercial importance. Pressure on sloping land resulting from development policies and from FDI in mining, hydropower and agriculture increases the risk of land degradation and environmental pollution.

These risks enhance the vulnerability of the rural poor. The Northern Uplands ranks second in poverty with a rate of 46%, of the 47 priority poverty districts nationwide, 32 are located in the North. Environmental degradation and biodiversity loss have important impacts on the livelihoods of the rural poor. Land degradation would lead to decrease in productivity of the farming system and thus to food insecurity and lower income. The same trend would occur with loss of biodiversity. Farmers depend on the forests for food in times of scarcity, for nutritive complement in their daily diet, for medicines and for construction and fuel materials. Furthermore, NTFPs' sale constitutes over 40% of the rural household income. In terms of pollution, the health of the population is at risk which could results in unavailable labour for household production.

The Government of Lao PDR (GoL) recognized the close links between the environment and the livelihoods of the rural people and gave high priority to the environment in the National Growth and Poverty Eradication Strategy (NGPES) adopted in 2003 in order to achieve its long-term national development goal:

> "The socio-economic development of the country must be balanced between economic growth, socio-cultural development and **environmental preservation**. These are the three pillars of the Lao PDR's development policy."
>
> "Environmental conservation and natural resource management are a high priority, for they are integral to poverty eradication. Accordingly, close attention is given to conserving the rich biodiversity of the land. In addition, close attention is given to community-based forest management, upgrading deteriorated ecological areas, countering industrial pollution and other concerns."

Furthermore, in terms of governance and the role of GoL, the NGPES states:

> "With the transition to a more market-based economic system, the Government must be fully responsive to the needs of both public and private enterprise. At the same time, however, it must provide the policy and regulatory framework that **conserves the environment and improves the livelihoods of the Lao people**."

The NUCCP reflects the national strategy and integrates the following elements in the design of the programme: Governance; Institutions and Policy Dialogue; Poverty, Gender and Ethnicity; Agriculture and Extension; Land and Natural Resource Management, Value Chain and Market, Foreign Direct Investment (FDI); and Environment. The Programme activities evolve around agriculture/commodities development, land and natural resource management, trading environment, policy dialogue, institutional strengthening and coordination, and small infrastructure development.

Programme components are:

1. Food Security
2. Agricultural Productivity and Marketing
3. Land and Natural Resource Management
4. Village Capacity Building and Networks
5. Local Governance and Planning
6. Programme Management

The NUCCP will implement pilot programme activities in Luang Prabang, Huaphan and Phongsaly and in 3 districts for each province.

This paper focuses on Environmental issues. It combines an Environmental initial examination with programme design. It presents an overall environmental description of the Northern Uplands, environmental issues affecting agriculture production in the pilot area, impact of scaling up agriculture activity on environment and interventions which may be used to moderate negative environmental impacts, An assessment of potential impacts of programme activities and an environmental management plan including institutional framework.

2. Environmental description of the programme area

2.1. Lao Northern Uplands

Northern Lao PDR is characterized by a diverse range of topography, ecosystems, ethnic cultures and production systems. Rugged terrain and mountains prevails in the landscape forming fertile river valleys and sloping lands of varying degrees. 66% of the country's surfaces are sloping lands of over 20 degrees and 33% are slopes over 30 degrees (UNEP 2001). 15 of the 18 highest mountains in the country are located in the North, the highest one is Phou Bia peaking at 2,820m (NSC 2008).

The broken relief combined with soil nature allow for a variety of ecosystems. The country is rich in biodiversity and forests still cover 41%[1] of the country's surface (WB 2005). Of the 7 main Habitats in Lao PDR of high international significance, 5 can be found in the Northern region. These areas are recognized as supporting considerable number of species (WB 2005). NTFPs including wildlife and plant products form an important part in the livelihoods of the rural poor. All rural households draw their food either as complement or supplement from the forest. Forests are a reserve for food security and a source of nutritious enrichment for the diet of vulnerable rural dwellers in addition to providing medicines and building and fuel materials. In the paper "*Making the economic links between biodiversity and poverty reduction: the case of Lao PDR* (2005)", Emerton reported an annual contribution of forest products in gross production to the national economy of USD 350 million of which two thirds comes from local household consumption (IUCN, WCS, WWF 2007). Furthermore, NTFPs contribute to over 40% of poor rural household income (IUCN 2002).

Pressure from the need for income and international demand lead to an unsustainable extraction of wildlife and other forest resources and poses a threat to biodiversity. In 2007, the three major conservation organizations working in the Lao PDR (IUCN, WCS and WWF) published an alarming joint paper: "Consuming the Future – The real status of biodiversity in Lao PDR" in which they quoted studies revealing the dwindling state of biodiversity in the country. They point to unregulated access to natural resources and insatiable demand as the main causes.

Recognizing the importance of biodiversity conservation, the Government has created 20 National Protected Areas (NPA) and two corridors since 1993. Five of these NPAs are located in the Northern Uplands (Nam Phui, Nam Ha, Phu Daen Din, Phu Loei, Nam Et and Nam Xam). Provinces and districts have also defined their protected areas. It is estimated that total PA coverage (national + provincial + district) amounts to 5.3 million hectares equivalent to 22.6% of the country's surface (WB 2005). However, IUCN/WCS/ WWF paper showed that even in NPAs, biodiversity is declining.

[1] Figure from 2002.

Topography is also a major factor defining the farming system in the Northern Uplands. Paddy rice cultivation is limited to flat land along river valleys, on plateaus and in some cases on gently sloping lands turned into terraces. The Diagnostic Study reports a total paddy area of the eight northern provinces of 109,695 ha equivalent to 17.7% of the national total. Thus the Northern Uplands landscape is mainly represented by sloping land farming system (including permanent agriculture land, shifting cultivation land and plantation) and forests. *For detailed information on land use please read the Working Paper on Land and Natural Resource Management and for farming systems read the Working Paper on Agriculture and Extension.*

In general, the climate of the Northern Uplands follows the tropical monsoon pattern with annual rainfall ranging from 1,122mm to 2130mm. However, the topography again creates microclimates in different milieus contributing further to the diversity of ecosystems.

Lao PDR is also rich in water resources. Watercourses crisscross the country with the Mekong as the main river flowing from North to South and forming a large border with Thailand on the West. There are 39 tributaries in the Mekong river basin which covers about 80% of the country. Surface and ground water quality is still good with proper oxygenation and low nutrient content. WEPA reports 5 major catchment areas over 5000 km^3 in the Northern Uplands namely : Nam Ou River Basin (Phongsaly – Luang Prabang); Nam Suang (Luang Prabang); Nam Khan (Luang Prabang); Nam Ngum (starting in Xiengkhouang – Xaysomboon – Vientiane); Nam Nhiep (Xiengkhoung).

Basin	River Basin Name	Watershed area [km^2]	Annual discharge [m^3]	Length of main stream [km]
1.	Nam Ou	19,700	12,276,964,800	390
2.	Nam Suang	5,800	3,654,076,320	150
3.	Nam Khane	6,100	29,454,624,000	250
4.	Nam Ngum	16,500	23,021,280,000	1,403
5.	Nam Nhiep	4,270	5,885,248,320	156

Source: WEPA (quoting source from Department of Hydrology and Meteorology, 2004)

According to FAO's Aquastat database 2007, the country has an estimated annual internal renewable water resource of 190 billion m^3 or 33,062 m^3 per capita which is the highest per capita internal renewable water resource in the region. The extensive water resource provides a great potential for hydropower development. The NSEDP identified hydropower as one of the main areas for development. The Diagnostic Study (*DSNUSD*) counted 54 hydropower project sites in the Northern Uplands of which 31 have MOU signed, 1 has preliminary design approved and 3 have contracts approved. The rest have no MOU yet.

The country also abounds in mineral resources. There are 62 mining projects at different stages of prospection, exploration or exploitation in the Northern Uplands (*DSNUSD*). Potential minerals comprise copper, coal, zinc, lignite, antimony, iron, limestone, clay, lead, sapphire, tin and gold. Foreign direct investment accounts for 76% of these projects and 31 are Chinese investments.

Another though less enticing feature in the Lao environment is landmines. According to the Landmine Monitor Report 2008, "Lao PDR is affected by landmines but the problem is overshadowed by the world's worst (cluster) submunition contamination, which dates back to the Indochina War of the 1960s and 1970s when it experienced the heaviest aerial bombardment in history..." Although there is no credible estimate of area of contamination, it is evaluated that 50% of all agricultural land is affected by UXOs (WB 2005). The presence of unexploded cluster submunitions and UXO hampers the development of the country as it renders land inaccessible, it constrains agricultural expansion and forest management, it increases the cost of development projects when land needs to be cleared, it kills people, livestock and wildlife and it maintains continual insecurity (UNDP 2008). In 2007, at least 100 casualties due to mine/ERW had been reported, resulting in 31 people killed and 69 injured. In 25 cases, the incident occurred while undertaking farming activity; exception made for one case, casualty's occupation recorded were "farmer" or "child"; Xiengkhouang is the province with the most recorded casualties (27). In addition, the need for income also drives the rural poor to search for UXOs for sale as scrap metal. The

NESDP 2006-2010 recognizes that UXOs' issue is "one of the major security challenges facing the poor communities".

Rural village environment in the target area is still cleared from domestic plastic waste as the consumption of plastic material is still low. Water supply quality in the majority of villages is good, however, in newly resettled village with limited land, people live in close proximity raise small animals in the same space. This increases the risk of water contamination of waste which could lead to health problems. Sometimes, the constraint of space is such that it is not possible to follow the rule of Nam Saat where wells and boreholes have to be located at least 15m away from latrines and animal raising area.

2.2. Pilot areas

Luang Prabang

Geographically, Luang Prabang province lies at the heart of the Northern Uplands with a border in the north with Vietnam. Luang Prabang is targeted as the hub for economic development of the northern region by the Lao-Chinese Planning Preparation Group who drafted a master plan for 2004 – 2008. The province has a plan to establish an industrial zone in Khet Nam Thouam (Nambak district).

In terms of environment, Luang Prabang shares the characteristics of the Northern Uplands as described above. However, one landscape feature differs from other provinces: smallholder teak plantations. About 12,000 ha of teak had been planted in the province since the 1990s. Rubber plantations are also gaining visibility in the province with smallholder stands and concessions.

Insert maps

Huaphan

Huaphan is the easternmost province of the Northern Uplands sharing borders with Luang Prabang, Xiengkhouang and Vietnam. Due to its geographical situation and communication links, the province has a lot of contact and exchange with Vietnam.

Different microclimates allow for a diversity of ecosystems. There are 3 NPAs in Huaphan: Nam Et and Phu Loei (merged into one) in Viengthong district and Nam Sam in Xamtai district. The creation of these NPAs combined with development policies has an important impact on the livelihoods of the population: land constraint for livelihoods and for production.

In Sopbao district, large areas covered with terrace paddies give a striking contrast with the rest of the province. Maize has also gained momentum and was produced in all districts. The colder climate in November-December-January, limits the production of annual crops like rice in the dry season. On the other hand, farmers have started to plant fruit orchards like plums and peach which are more adapted to the climate.

Insert maps

Phongsaly

Phongsaly borders Oudomxay, Luang Prabang, Vietnam and China. It is the northernmost province and comprises the Phou Daen Din NPA. The province is covered with mountains, has very little flat land and access is difficult and limited. A feature in the landscape of the province is tea plantation. Unlike other provinces, Phongsaly is populated with diverse ethnic minorities with very little Lao Loum communities. Comparison between 1995 and 2005 showed a sharp decrease in upland rice production compensated by increase in lowland paddies (*DSNUSD*). Maize production has also doubled.

Insert maps

3. Environmental issues affecting agriculture production in the pilot area

3.1. Topography - Soil

The rugged relief limits the potential for expansion of lowland paddy areas; it has higher surface water run off which increases the risk of soil erosion and degradation, and siltation in rivers and watercourses. On steep slopes, the use of inputs like fertilizers, pesticides and herbicides is not efficient due to run off. Currently in many areas of the Northern Uplands, farmers do not use external inputs because they cannot afford the cost.

Production area on sloping lands is more difficult access, requires more time and energy to work on and limits the use of machinery.

Topography and soil also define possible farming system and grazing areas.

3.2. Hydrology

Water resource influence production and yields, scarcity and flooding have negative impacts on yield and the on the survival of the crop. Water availability also determine the potential for irrigation which allows an increase in yield and production and the possibility of more cropping seasons per year. It thus defines the cropping pattern.

Water is also vital for livestock raising as animals need water like humans. In addition, the quality of water supply influences animals' health and survival

3.3. Climate and climate change

Weather and rainfall influence cropping pattern and types of crops. For better yields, the use of adapted species is required.

Climate change and global warming affects agro-ecological systems by enhancing water scarcity. Erratic seasonal pattern with heavier rainfall in the wet season and unpredictable start and end of the seasons along with longer and warmer dry season has been observed. This increases the risk of flooding and drought, of soil erosion, river bank erosion and landslides, of reduced yields or crop loss, pest outbreaks and animal diseases.

Forests and other habitats would be affected by the same events and biodiversity would be at risk and thus NTFPs collection either for food or for income would be greatly reduced. This will result in increased vulnerability of the rural poor.

3.4. Human decisions and activities

3.4.1. Decision resulting in land pressure

In areas of limited land resource, resettlement policy has brought people closer to services but at the same has increased pressure on land and the management of agricultural activities. In areas of limited land resource, shifting cultivation stabilization policy has reduced slash and burn practices but at the same time it enhances pressure on land.

The pressure on land results in limited area for production, limited number of plots (3), intensification of production, short fallow periods leading to rapid decrease in soil fertility, enhancement of surface erosion and of weeds proliferation. To cope with the situation and maintain productivity, farmers will resort to the use of external input like fertilizers, pesticides and herbicides if their income permits.

3.4.2. FDI

FDI in the form of contract farming or concessions affects the agro-ecology system by imposing mono cropping in the landscape. Monoculture reduces agro-biodiversity as well as ecological diversity. The uniformity of the vegetation increases the risk for pest and disease outbreaks. Furthermore, monoculture on sloping lands enhances soil erosion and degradation

3.4.3. Hydropower

Hydropower activity alienates farmers from production area and increase pressure on land. Often it wipes out fertile land fit for paddy rice cultivation. Flooding of the reservoir changes the ecology of the area and affects biodiversity.

On the other hand, it provides income to the country and work and income to the rural people. The reservoir also provide a potential for irrigation to agricultural lands and for village water supply.

3.4.4. Mining

Mining activities can have adverse effects on agriculture if mitigation measures were not implemented and standards followed. Open pit exploitation lead to erosion and siltation, loss of vegetation, habitat and biodiversity. Ore processing waste can pollute soil, rivers and ground water with hazardous chemicals as well as air pollution. Populations located downstream from the mining activity will have their health and livelihoods affected.

4. General Impact of scaling up agriculture activity on environment in the pilot provinces

Two major constraints in the scaling up of agricultural production in the pilot provinces are land and labour. These are limiting factors which will guide farmers' decision. As a result, intensification of production will have important impacts on the environment and therefore on household livelihoods and health.

As seen earlier, pressure on land will lead to shorter fallow period which is an important factor for soil regeneration and weed control in the sloping environment. Consequently, soil erosion and degradation will potentially occur along with increased weeds infestation. This results in low fertility, loss of topsoil, high rate of siltation and increased demand of labour for weeding. Weeding is an activity that consumes a lot of the farmer's time and in a lot of cases, this is the responsibility of women and children.

To cope with the situation, farmers will be drawn towards the intensive use of external inputs such as manure or fertilizers and herbicides. The unsustainable use will lead to leaching, run off and pollution of rivers, lakes, groundwater, and soil. Furthermore, control of banned chemicals is weak in the region and products like DDT are still in use in the area and farmers are unaware of the hazards that these chemicals might have on their livelihoods and health.

During the field visit, a few farmers reported animals being ill or dying after grazing or drinking close to fields sprayed with chemicals, others reported incidence of stomach ache and diarrhea in children. However, these situations had not been monitored and no analysis had been performed as evidence.

Monoculture of commercial crops will also push towards the use of fertilizers, herbicides and pesticides as the condition will favour pest development. Already there are anecdotal reports[2] of watercourse contamination in areas of intensive maize cultivation (Kenthao, Namor and Bokeo) but again no evidence could be provided scientifically.

Intensification of small animal raising also pose a threat to the environment. Usually small animals are reared close to dwellings and their waste if not properly managed will cause sanitation problems and nitrate pollution of water resources.

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2 Personal communication

Agricultural activities such as the burning of slashed fields, lowland paddy cultivation and cattle raising produce greenhouse gases contributing to global warming and climate change. This in turn has effects on agriculture and rural households' livelihoods as seen earlier.

5. Interventions which may be used to moderate negative environmental impacts of scaling up agriculture in the pilot provinces

Erosion – Erosion control measures include:

- Planting of perennial crops on steep sloping land reducing direct exposure of the soil to the impact of rainfall, when established perennial crops reduce or eliminate the soil work;
- Agroforestry system with trees/perennial crop + food crop + commercial crop, contour planting, sylvo-pastoral system;
- Low tillage practice, direct mulch based cropping (DMC) system;
- Terracing.

Soil fertility can be increased with the use of :

- manure, compost;
- fertilizers, i.e. efficient use (quantity, quality, timing) of regulated fertilizers with awareness of farmers;
- rotation with leguminous species, inter cropping with leguminous species

Chemicals use :

- herbicides use can be greatly reduced if erosion measures are practiced as weeds' seeds dispersion is enhanced by erosion
- weeds can also be controlled by direct mulch based cropping (DMC) system;
- the planting of neem tree which is a natural insecticide in the production area helps in reducing pest attacks;
- integrated pest management, combination of crops and practices that breaks the life cycle of pests.

Monoculture impact can be avoided by measures above and turning towards a more diversified production system.

Organic production has lots of potential and a growing market. At the moment large areas of the region are still chemical free. This is a feature that can benefit the country.

Small animal raising threat to the environment can be eliminated by defining an area for small animal raising that respect Water Supply standards, and undertaking an awareness raising campaign amongst the population.

Greenhouse gases production can be compensated with carbon sink by increasing forest cover; reducing the use of fossil fuels and increasing production and use of biofuels

Monitoring of environmental indicators with reporting and information dissemination as well as including environmental concern in the decision process of planning are critical to the sound and sustainable livelihoods of the rural population.

6. Assessment of potential environmental impacts of proposed programme activities and mitigation measures

Overall programme activities would have positive impact on the environment as the rationale behind each activity focus on the improvement of the livelihoods of the rural population which includes their health, their living environment and their production environment. Agricultural

activities proposed have integrated many measures cited above in order to reduce environmental impacts: diversity, crops association and rotation in order to increase soil fertility, reduce soil erosion, techniques for weed control, the use of natural fertilizers, etc. Activities in Land and natural resource management will only benefit the environment. Only infrastructure development would have potential negative impacts on the environment, however, the structures proposed are small scale and should not produce major environmental impact if mitigation measures are properly implemented.

6.1. Agriculture and Extension activities

A feature of this programme component is that it proposes models and systems from which farmers can choose according to their strength, their ethnic background, their aspiration and the specificity of their production environment.

6.1.1. Support, promotion and diffusion of agriculture models

a. Improvement and development of animal production through improvement of animal feeding, animal health and animal husbandry.

The programme proposes three forage systems: association of Gramineae and Stylosanthes, association of cassava and soybean, association of sweet potato with contour lines of Stylosanthes. These systems will benefit the environment by reducing erosion, maintain/increase soil fertility as well as improving the nutritive value of animal feed.

Animal housing: construction of pens and fencing prevents animals from moving freely which can be of environmental benefit in regards to sanitation. However, if the density of animal is high, there is risk of concentration of waste with direct impact on water contamination and cumulative impacts on population's health. This can be mitigated by the control of density and waste collection for fertilization purpose in the production area.

b. Improvement of agricultural production in the upland fields

Activities aim to support and promote the establishment of integrated and diversified food and cash cropping systems with specifically a view to (1) facilitate soil fertility management, weed and pest control and (2) manage risks related to market price fluctuations. All systems proposed include diversity in association of crops and rotation and provision of technical advice for pilot trials on soil fertility management (association with livestock, management of crop residues), weed control (land preparation work, management of vegetal cover) and pest management (trap and barrier systems). This minimise erosion and the need for chemical inputs. The activity thus has high positive impacts on the environment.

The establishment of a process of seed selection and diffusion at village level reduces vulnerability to climate change. High yield crops are better adapted to the prevailing production environment.

c. Development of vegetable production

The systems proposed consist of diverse associations of vegetables crops such as: chilli, garlic, onion, cabbage and Chinese cabbage, salad, tomato, parsley, coriander, mint, etc. This is promoted on riverbanks and village gardens with the main objective of providing diversified sources of food for reducing malnutrition of poorer households, women and children. Riverbanks are fertile and the risk of soil erosion is minimal. Furthermore, farmers are used to use manure in vegetable growing.

Construction of water supply system for human consumption as well as for the watering of vegetable gardens, as seen earlier, might lead to health hazard. Village water supply can be contaminated if the rules and standards of Water Supply and Sanitation are not followed. Impact

can be eliminated by a careful selection of construction site and by raising awareness of the population on the issue.

Seed selection is also included with effects as stated above.

d. Improvement and development of agricultural production in the lowland fields

Establishment of new paddy fields will have positive impact on the environment as it will release the pressure on land and allow for forest rehabilitation. It will have negative impact in terms of erosion during land leveling. This will be minor as it will occur at specific time and area. Most of the land suitable for conversion to paddy field is land already farmed or fallows. Loss of vegetation and biodiversity will occur in fallows and the importance of the loss depends on the scale and continuum of the area converted. In the Northern Uplands, there is limited amount of land suitable for conversion and most of it is scattered small plots. On large scale conversion area, an EIA needs to be undertaken.

Small scale irrigation schemes if not well designed may lead to change in habitat and biodiversity as well as scarcity of water to downstream production areas and population. Negative impact can be avoided by a good design and professional supervision of construction.

Dry season cropping systems (mainly legumes such as soybean and peanut and vegetables like onion, garlic, Chinese cabbage and cabbage) produce the same benefit as above. The use of manure on vegetable production in the dry season increases the fertility of the soil for the rainy season production.

e. Development of perennial crops and plantations

Perennial crop system and plantations are encouraged on steeper slopes where soil erosion risk is higher. Systems proposed are association of crops , intercropping or rotation. Residues left *in situ* after field clearing should minimize erosion at the establishment phase. Tea plantations are usually associated with shade trees, and plantation in rows following contour lines reduces erosion.

However, on very steep slopes with shallow or fragile soil, soil disturbance for plantation will exacerbate erosion and loss of soil in addition to the loss of erosion protection provided by natural vegetation.

6.1.2. Capacity building for villagers

Impacts of capacity building activity will have significant positive impacts on the environment. Farmers would be aware of environmental issues and would be knowledgeable in best agricultural practices for their production environment. Subjects of training include (but not limited to) animal husbandry, soil fertility management, pest and weed control, seed selection, organic fertilization through association with animal production.

In lowland production system, the programme does not exclude the use of chemical fertilizers instead it provides training for efficient use.

6.1.3. Capacity building for extension staff

Impact will be the same as above.

6.2. Land and Natural Resources Management activities

This component aims to promote the sustainable use of and improve the access to land and natural resources. Thus from the start, it incorporate environmental concerns. It is designed to contribute to achieve food security, eco-system integrity, sustainable development and poverty reduction.

6.2.1. Piloting a Provincial Land Information System

This activity will have an indirect positive impact on the environment as it will provide useful information to decision makers in planning and management.

6.2.2. District Land Use Zoning for Agriculture and Forestry

This activity will have the same impact as above.

6.2.3. Participatory Land Use Planning at Village Cluster/ Village Level

Planning is the departure point for development, if properly undertaken, land use planning will have direct effects on the environment as it is based on suitability zoning. Suitability is assessed based on biophysical land properties such as climate, soil, topography and vegetation cover.

Participatory planning involves decisions of the population. This allows for an exchange of views and knowledge (scientific and traditional), farmers are informed on possibilities and can decide on what suits them best. Participatory land use planning can also reduce land conflicts.

6.2.4. Support Community Based Forest Management including NTFPs

As discussed earlier, forests and NTFPs form a crucial part in the livelihoods of the rural poor. This activity focuses on village utilization and protection forests and will have important direct positive impacts on the environment and on the livelihoods of rural households.

Activities include (but are not limited to) awareness raising on forest and bio-diversity conservation, environmental protection; training on community based forest management planning and management; forest survey, inventory and mapping; formulation of management plans and regulation; forest rehabilitation activities; and domestication of selected NTFPs.

In the long run, the activity could eliminate vulnerability of poor households as they would have a sustained supply of forest and wildlife products for consumption and for sale. Furthermore, the trend in biodiversity decline could be stabilized; endangered species could be protected and even restored (in the case of plant species). The conditionality is if awareness raising activity is successful, and planned activities well understood and implementation of sub-activities successful.

6.2.5. Preparation for the Participation in REDD

As its name says Reduced Emissions from Deforestation and Forest Degradation would have direct positive impact on the environment if implemented. In addition to providing food, timber, fuelwood, medicine, habitats for wildlife, forests have also other functions as protection of water sources and recreational environment.

6.2.6. Control and Monitoring of Agricultural Concessions

This activity also has positive direct impacts on the environment, monitoring of environmental indicators of agricultural concessions allow for prompt intervention in case of hazardous events.

6.3. Value Chain and Producers' organizations

This component was designed with the aim to improve producers' income through value adding of agricultural products, to reduce farmers' vulnerability and improve their position in the value chains and to contribute to policy development in trade and Producers' Organizations. Activities proposed that have impacts on the environment comprised small scale infrastructure development. Other activities have no notable impacts on the environment.

Access tracks are planned by the programme in order to link remote villages. These tracks will reduce the time to move from one place to another. They will allow villagers to access services and will facilitate movement of goods. Many of these tracks are already in construction, villagers do the work themselves. This is undertaken with the consent of villagers and no resettlement or compensation is necessary or planned. However, on sloping land construction may have an impact on the environment depending on the fragility of the area affected. These impacts include loss of vegetation, increased erosion, formation of gullies and increased risk of landslide. Mitigation measures to reduce erosion include embankment or planting of soil fixing species, and drainage construction where needed. It is recommended to use the service of professionals for the design and supervision of construction. In vulnerable environment, an IEE is recommended.

Dryer facilities may have minor negative impact on the environment if they produce heat and they are located close to other constructions. Location and space are thus important as mitigation measures.

Maize shellers usually left waste on the side causing inaesthetic value to the environment. If the surface then receives rainfall and there is water clogging then this might lead to sanitation problems. A waste management plan is needed. Corn shells can also be collected and ground for fertilization purpose.

Para rubber processing involves the use of ammonia to prevent pre-coagulation at collect or during transport and then later the use of formic acid/ sulfuric acid to coagulate the latex under controlled conditions. These chemicals produce a repulsive smell that can incommode handlers and people around. Direct exposure to these chemicals or their fumes might irritate the eyes, the mucous membranes of respiratory and digestive tracts and the skin. Direct exposure of the skin to liquid formic acid or concentrated fumes can lead to chemical burns and exposure of the eye can damage the eyes permanently. Inhaled vapours can burn the respiratory tract.

Ammonia should not be mixed with bleach or chlorine based products as it creates a poisonous gas. Ammonia hazardous property depends on its concentration at 48.9–95.7 g/L it is considered irritant, at 95.7–226.3 g/L it is classified as corrosive and >226.3 g/L it is not only corrosive but dangerous for the environment as well. Ammonia leached into water stream is toxic to fish and amphibians even at diluted concentration as these animals do not possess the mechanism that prevents its build-up in the blood stream.

Mitigation measures for small rubber processing facilities include the selection of site away from dwellings, waste management plan and implementation of filters, awareness raising and safety equipment for workers. EIA/IEE is important as well as follow-up of mitigation measures.

6.4. Activities related to governance, policy dialogue and FDI

As discussed previously, policies have impacts on environment. Policy dialogue on improvement of upland development policies will have positive impacts on the livelihoods of the rural people and

their environment. Policy dialogue including different sectors and enhancing their cooperation and coordination will also have impact on the environment. Per example, the issue of chemical control on the import of banned pesticides and herbicides, concerns MAF, WREA, Customs and Trade. Regulatory framework should give strength to the enforcement of environmental laws.

Planning activities at all levels would also have impacts on the environment, it is thus important to include environmental concerns into the planning process.

Capacity building of human resource in sectors like agriculture and forestry, land and natural resource management, environment, etc. will have indirect impact on the environment.

Assessment and monitoring of investment project proposal will also be beneficial to the environment as it provides safeguards which will be positive for the environment as well as for the population.

7. Environmental management plan (EMP)

This EMP is elaborated to prevent or minimize adverse impacts from project activities. Mitigation measures should be in compliance with GoL guidelines on environmental protection. The following measures relate to activities identified above as having negative effects on the environment.

7.1. Agricultural activities

Potential adverse impacts from agricultural activities were identified above as erosion, contamination of chemicals or organic compounds in soil and water. Project activities have already integrated measures to reduce or eliminate these effects. It is nonetheless recommended to undertake monitoring of environmental indicators as set by the GoL of the village environment including living quarters, production area, forests and water sources, to ensure these measures are effective.

Animal rearing in enclosure: Organic waste produced by this activity might contaminate ground water. A control of animal density can reduce the problem. In addition waste can be collected and use as fertilizers on cropping areas. For pig pens, if no flooring is constructed, the use of straw (or wood chips) to absorb liquid waste can reduce leaching into the ground.

Expansion of paddy cultivation land: If a new (not in use before) land should be cleared, it is important to undertake a biodiversity assessment to ensure minimal biodiversity loss. If the biodiversity loss is evaluated as high then clearing should not be allowed. As discussed earlier, only few suitable areas remain. If a large area would be converted an IEE should be conducted prior to the activity. If the paddy area is situated close to a stream, care should be give to protect the bank for the leveling work to minimize erosion into the water.

Plantation: Plantations should not be encourage on extremely steep slopes and shallow or fragile soils. Encroachment on forest land should not be allowed.

7.2. Small infrastructures

Small irrigation schemes: This activity may affect the habitat of flooded and downstream areas and the watercourse by erosion and siltation, by reduction of water flow to downstream sites due to over abstraction. Water supply of downstream communities will be adversely affected as well as wildlife and fisheries. An IEE should be undertaken for specific schemes and followed by monitoring of implementation of mitigation measures. Survey and design are very important with consideration of drainage. It is recommended to use the service of professionals (who understand and follow GoL guidelines) for the survey, design and supervision of the construction for all irrigation schemes.

Village water supply: The potential for water contamination can be reduced with awareness raising of the community on sanitation and hygiene issues (human and animal). Furthermore, the site selection of the water supply scheme should be conformed to the rules of the Water Supply and sanitation sector, which is minimum 15m (depending on type of soil) away from latrines or waste production area.

Access tracks: There is no requirement in the Environmental Protection Law[3] of 1999 for an EIA to be performed for access tracks as proposed in the project. However, MTCPC has its own framework for managing environment impacts called "Environmental Guidelines for Road Projects". The guidelines include environmental effects and their mitigation measures. The guidelines should be followed. Again, it is recommended to use professional services and the planning, survey, design and supervision of construction or rehabilitation of the tracks should be undertaken according to the guidelines. Land clearing should minimize encroachment into wetlands and forests in order to reduce impacts on flora and fauna. During construction, precautions should also be taken to avoid degradation of water quality due to erosion. Debris from the construction should be managed to avoid obstruction of streams. Care should be taken at places of river crossings; bridge building is not included in the project proposed activities. Bank protection is important to reduce erosion and siltation and sedimentation. Road maintenance should be included in planning and design and participation of rural communities for access tracks construction and maintenance is required for sustainability and ownership. Measure to control erosion and stabilize slopes like the planting of grass should be undertaken. Mitigation measures should be monitored and an IEE is recommended for susceptible area.

Processing facilities: The selection of location of the processing facility is important. If the process creates smelly odour, noisy sounds or heat, the facility needs to be away from the housing area in order to not disturb people. It also needs space to ventilate and dissipate heat and odours. A waste management plan should be prepared, implemented and monitored.

Para rubber processing should comply with best practices in order to reduce waste and improve production efficiency. Mitigation measures should include like above site selection, waste management plan and in addition implementation of filters for waste water, awareness raising and safety equipment for workers. An EIA/IEE is recommended as well as follow-up of mitigation measures.

7.3. Implementation arrangements and responsibilities

NUCCP Programme Management Office will be established within the Department of Planning of MAF and will provide overall management and coordination. At provincial level, Provincial Implementation Units will be established within PAFO and will be responsible for programme implementation and management, coordination with line agencies and supervision of district level initiatives.

Agricultural activities will be the responsibility of Crops and Livestock divisions. NTFPs will come under Forestry division and irrigation schemes are under the responsibility of Irrigation division. For access tracks development and construction of processing facilities, coordination with MCTPC and involvement of PCTPC and DCTPC are required. Water Supply construction requires the involvement of the Water Supply and Sanitation division of the department of Health. The conduct of EIA/IEE falls under the responsibility of the investment/development projects, its review is the responsibility of WREA and its counterparts PWREO and DWREU as well as the monitoring of compliance and the monitoring of environmental indicators.

[3] Environmental laws and regulations are being revised.

8. Institutional framework

The Water Resource and Environment Administration (WREA) was established in 2007 from a scission from the Science Technology and Environment Agency (STEA). WREA sits under the Prime Minister's Office and its structure comprises the following departments:

1. The Cabinet;
2. The Department of Water Resources;
3. The Department of Environment;
4. The Department of ESIA
5. The Department of Meteorology and Hydrology;
6. The Water Resources and Environment Institute;
7. The Secretariat of the National Mekong River Commission.

Currently, WREA with the assistance of the Strengthening Environmental Management Project Phase II (SEM II), funded by SIDA, is reviewing Environmental laws and regulations. This includes a set of environmental standards, procedures for monitoring environmental indicators and processes for assessing environmental impact of investment proposals[4]. At the present stage, the draft had been finalized and is in the process of review and approval. Programme implementation should use the new revised versions of the environmental law and regulations. Other documents under revision include: the National Biodiversity Action Plan and Strategy; the National Environmental Action Plan and the Provincial Environmental Action Plan and the National Environmental Education and Awareness Action Plan.

While the above documents are being drafted or revised, the older documents are still effective: Regulations on National Biodiversity Conservation Areas (1993), National Environmental Action Plan, was adopted in (1994),Environmental Protection Law (1999), Regulation on the Environmental Impact Assessment (2000). The Lao PDR is also party to 14 multilateral environmental agreements (MEA) as shown in table 1.

Table 1. Lao PDR and signed MEAs

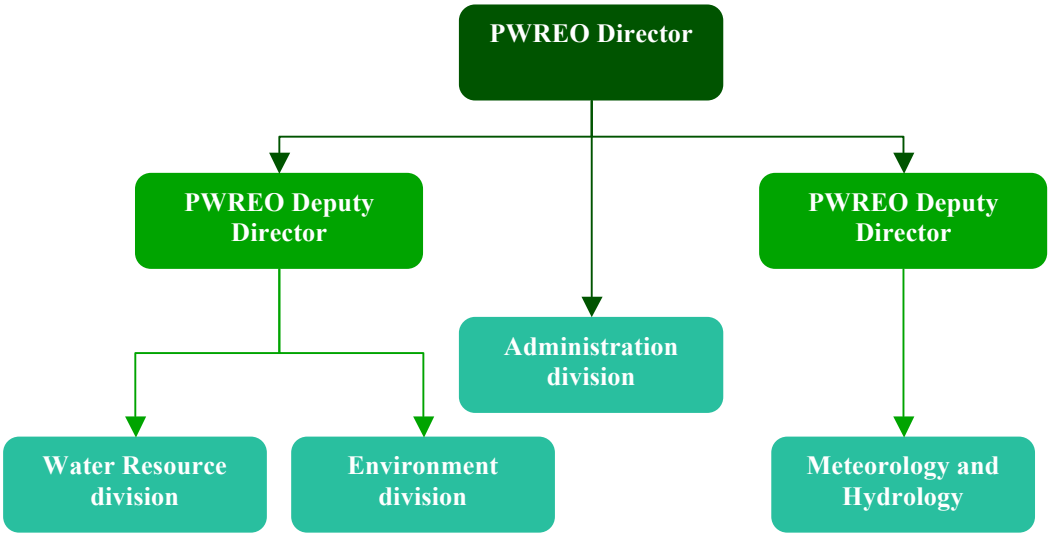
	MEA	Signed	Ratification/Accession/Acceptance	In Force
1	World Heritage Convention (WHC)		20 March 1987 (rat.)	20-Jun-87
2	Framework Convention on Climate Change (FCCC)	--	4 January 1995 (acs)	04-Apr-95
3	Agreement on The Cooperation for The Sustainable Development of The Mekong River Basin (Mekong Agreement)	05-Apr-95	--	05-Apr-95
4	Convention on Biological Diversity (CBD)	--	20 September 1996 (acs)	19-Dec-96
5	Convention on Combating Desertification (CCD)	30-Aug-95	20 September 1996 (act)	26-Dec-96
6	Vienna Convention for the Protection of the Ozone Layer	--	21 August 1998 (acs)	21-Nov-98
7	Montreal Protocol on Substances that Deplete the Ozone Layer	--	21 August 1998 (acs)	21-Nov-98
8	Persistent Organic Pollutants (POPs)	05-Mar-02		
9	ASEAN Agreement on Transboundary Haze Pollution	10-Jun-02		

[4] Note that the TOR for this assignment requested the design of procedures for monitoring environmental indicators and of processes for assessing environmental impact of investment proposals. These already exist and it is not advisable to duplicate the work as it might lead to confusion.

10	International Plant Protection Convention		28 Feb. 1955	
11	Plant Protection Agreement for the Asian and Pacific Region	25-May-56	17 March 1960 (rat)	
12	Kyoto Protocol		06 February 2003 (acs)	16-Feb-05
13	Cartagena Protocol on Biosafety (Cartagena)		03 Aug. 2004 (acs)	1-Nov-04
14	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)		01/03/2004 (acs)	30-May-04

Source: Adapted from GoI/UNDP 2004

WREA counterparts at provincial and district levels are the Provincial Water Resource and Environment Office (PWREO) and the District Water Resource and Environment Unit (DWREU). The organizational structure of PWRE0 varies according to province but contained the same components:



Most of the PWREOs have been established in 2008 and staffing is not complete yet.

Main duties cover four areas:

1. monitoring of urban environment
2. environmental education
3. review of EIA/IEE of investment project proposal
4. Collection and dissemination of meteorology and hydrology data.

At district level, DWREUs have not been established in all districts yet. Staffing requires 3 officers for water resource unit, environment unit and meteorology and hydrology unit. Staffing is not completed yet and in some cases, nominated officers have no background in environment or related fields.

SIDA support project SEM has been working with the environment sector since 2002. The second phase SEM II will end in 2010. Its aim is to build the capacity of WREA resources in order to have "a strong environmental authority in the country capable of managing the following core functions:

- Preparation of environmental policies and strategies;
- Reviewing and approving ESIA and IESE documents;
- Environmental licensing of polluting operations and projects;
- Defining and monitoring environmental standards;
- Environmental inspection, control and monitoring of projects and pollution control facilities;

- Ensuring public involvement and education in environmental issues of development plans and projects;
- National database on environmental information and state of the environment." (SEM II, 2008)

However, SEM II has been working with WREA and PWREO in some provinces (including Huaphan and Phongsaly) only and has no direct involvement at district level.

The capacity at provincial level is still low and the problem is exacerbated at district level. In fact, they have never done a proper monitoring of environment indicators as they have no equipment or funds for the conduct of their work. They still lack the capacity and experience for the review EIAs of investment project as well as the monitoring of compliance.

9. Proposed pilot programme activities for the environment sector

The role here is the safeguards of natural resources for sustainable development. The relation between the health of the environment and the livelihoods of rural poor households has been established as well as the need for environmental monitoring, for review of EIAs and for monitoring mitigation measures.

The programme will give the opportunity to WRE officers to gain knowledge and experience and to perform their duties at the same time. The focus is on on-the-job training, the pilot programme will provide equipment and tools. Activities proposed are set in the logframe below.

9.1. Implementation requirement

The service of an international Technical Assistance (TA) and a national TA is required; their work will complement each other. To increase efficiency of the international input, the national TA should start first with coordination between the programme and other agencies in order to prepare the international input. Detailed TOR for the two positions is presented below. TAs will be based at PWREOs with frequent communication with PMO and PIU. They will be responsible to the Programme Director/Team Leader and the coordinator from WREA.

WREA has produced many documents already and TAs will source their training material on existing documents. If any necessary document is missing, they will draft it and request approval from WREA. Planning of on-the-job training activities will be district specific and based on activities and implementation plan of each district. Training workshops will include officers from all provinces and districts but on-the job training will focus on one province at a time and implementation will be phased in order to ensure presence of one TA. Between each input, TAs will leave tasks for PWREOs and DRWEUs to undertake, it is important that each office complete their tasks before the next TA input in order to keep pace with development activities.

There is no provision of vehicle or motorcycle from the programme, SEM II has provided vehicle to some PWREOs already. District officers are expected to coordinate with DAFO for transport to monitoring areas. As for on-the-job training and monitoring, provision is made in the budget for vehicle rental and fuel. The proposed budget is presented below.

9.2. Proposed logframe for environmental monitoring activities

Environmental purpose: Secured and improved sound and sustainable livelihoods of the rural poor in selected areas of the Northern Uplands based on sustainable land and natural resource management and community driven development.	**Responsible Unit**	**Indicators**	**Sources of Verification**	**Assumptions**
Outcomes				
1. Villagers lived in a sound environment a. Monitor village environment indicators i. Establish and train an Environment contact person at Kumban/Ban level for observation and reporting; ii. Monitor village environment b. Report and coordinate with relevant agencies for problem solving (including the Water Supply sector amongst others)	DWREU DWREU DWREU	• Villagers' health • Environment indicators as set by WREA	• Health sector report • Environment monitoring report	• Cooperation between sectors • Available of funds for problem solving
2. Villagers worked in a sound and sustainable production systems with minimum chemical hazards to their health as well as their animals' health a. Include environmental consideration in the planning process i. Kumban/Village environment contact persons participate in Kumban/Village planning process ii. DWREU participate in the district planning process	Kumban/Village	• Villagers' health • Environment indicators as set by WREA	• Health sector report • Environment monitoring report	• Cooperation between sectors • Effective law enforcement

Development projects and public and local investment initiatives) c. Coordinate with the Agriculture Department for training of farmers in the sound use of chemicals d. Coordinate with Agriculture Department, Custom and other relevant agencies for the control of banned categories of chemicals. e. Monitor environmental indicators of production area and watercourses	DWREU PWREO/DWREU coordinates PAFO/DAFO implement PWREO/DWREU PWREO/DWREU			
3. Villagers enjoyed a sustainable supply of complementary food from the forest and watercourses a. Coordinate with the Forestry Division for training of villagers on the sustainable use and management of NTFPs b. Monitor biodiversity	PWREO/DWREU PWREO/DWREU	• Villagers' health • Environment indicators as set by WREA	• Nutrition report • Environment monitoring report	• Cooperation between sectors
4. Villagers are aware of environmental issues that affect their life a. Undertake awareness raising activity through community radio i. Write radio programmes on different environmental issues, translate and produce.	WREA	• Change in villagers' behaviour	• Environment monitoring report	• Villagers have access to radio broadcast
5. PWREO and DWREU performed efficiently their duties as planned a. Build the capacity of WRE officers at provincial and district levels i. Training and on-the-job training in ESIA, environmental monitoring and planning ii. TOT of district officers for the training of village contacts in environmental observation and reporting b. Provide tools to PWREO and DWREU officers for the performance	TA TA	• Confidence and knowledge of officers • Effective environmental monitoring • Use of data gathered • Effective coordination with other sectors	• Environment monitoring report • Minutes of meetings • workplans	•

of their duties, these include reference materials, IT equipment and mibole analysis kits (test kits).	CCP	• Longevity of test kits		

9.3. Proposed budget (in Euro)

		Quantities						Totals Including Contingencies ('000)				
	Unit	09/10	10/11	11/12	12/13	Total	Unit Cost	09/10	10/11	11/12	12/13	Total
B. Environmental Initiatives												
1. Capacity Building for PWRE Offices												
Provide equipment to assist in monitoring activities	3 province	1	-	-	-	1	1,000/province	3.3	-	-	-	3.3
Provide mobile analytical kits	district	3	-	-	-	3	20,000	66.7	-	-	-	66.7
On the job training for provincial and district staff	year	12	18	18	-	48	200	2.7	4.1	4.2	-	10.9
Environmental Specialist (I)	pmnth	3	2	1	-	6	16,000	53.3	36.3	18.5	-	108.1
Environmental Trainers (N)	pmnth	6	3	2	1	12	3,000	20.0	10.2	6.9	3.5	40.7
Subtotal								146.0	50.5	29.6	3.5	229.7
2. Capacity Building for DWRE Units												
Computers for DWRE units	unit	6	3	-	-	9	1,000	6.7	3.4	-	-	10.1
Provide other equipment to assist in environmental monitoring	units	6	3	-	-	9	400	2.7	1.4	-	-	4.0
Subtotal								9.3	4.8	-	-	14.1
3. Monitoring Initiatives												
Train in ESIA methodologies	workshops	2	1	1	-	4	2,000	4.4	2.3	2.3	-	9.0
Train in other environmental monitoring	workshops	1	1	-	-	2	2,000	2.2	2.3	-	-	4.5
Environmental monitoring	year	12	30	30	36	108	1,000	13.3	34.0	34.7	42.4	124.4
Annual performance reviews	year	-	1	1	1	3	1,500	-	1.7	1.7	1.8	5.2
Provision for media material and broadcast	year	1	1	1	-	3	3,000	3.3	3.4	3.5	-	10.2
Subtotal (Euro)								23.3	43.6	42.2	44.2	153.4
Total (Euro)								**178.6**	**99.1**	**71.8**	**47.7**	**397.1**

Note on budget provision:

- Training workshops unit cost is calculated for a 3-day training for 24 officers including per diem;
- On-the-job training and monitoring activities unit cost include per diem for 4 pax, car and fuel;
- Annual performance review unit cost include a one day workshop 50 pax, once a year rotating in the pilot province;

- Provision of equipment to assist in monitoring activities **include maps and references, GPS and internet linkage for provincial level only.**

TOR for Technical Assistance

Environment Specialist - Coach (International)

Duration : 6 person months spread over the first Three years of the Project, months being continuous.

Qualifications and Experience: The specialist should have tertiary qualifications in the field of Env Management. He/she shall have a minimum of 7 yrs work experie of Environmental Management in south east Asia, preferably with three years in Lao PDR. He/she must show proficiency in the use methodologies. He/she must be able to demonstrate the ability to knowledge and know-how in environmental monitoring, EIA and I communicate well (written and orally) and knowledge of Lao langu distinct advantage.

Location: Vientiane, Luang Prabang, Huaphan and Phongsaly

Responsible to: Programme director and coordinator from WREA

Background

1. Considering the rate and direction of development in the North of the Lao PDR, envi become unavoidable in order to secure and improve sound and sustainable livelihoods of th Northern Uplands. Investment projects will have important impacts on their livelihoods and t It is thus imperative to raise awareness amongst the population and to set up measures to s adverse effects of development activities.

However, environment is a young field in the Lao PDR and Water Resource and En at provincial and district levels need to be strengthened in order to efficiently perform their du Programme will use the opportunity of activity implementation to build their capacity in EIA/IE monitoring of environmental indicators and in planning and reporting.

Detailed Terms of Reference

2. The Environment Specialist will be responsible for:

(i) The coordination between the Programme, WREA and other Environment projects II) in view to prepare training plans and materials;
(ii) The establishment of a coordination/reporting mechanism between different levels Programme;
(iii) Advise and assist the Government in the procurement of mobile analysis kits;
(iv) Train Government counterparts and the Lao Environment trainer in the use and m mobile analysis kits;
(v) Working with the Lao Environment trainer, supervise the training (workshops and c in EIA/IEE reviews, in the monitoring of environmental indicators and in planning and
(vi) Assessment of the training and on-the-job training;
(vii) Reporting on each input.

Environment Specialist - Trainer (National)

Duration : 12 person months spread over the first four years of the Project, v months being continuous.

Qualifications and Experience:	The specialist should have tertiary qualifications in the field of Environmental Management, Environmental Sciences or related fields. He/she shall have a minimum of 4 yrs work experience in that same field. He/she must show proficiency in the use of EIA methodologies. He/she must be able to demonstrate the ability to transfer knowledge and know-how in environmental monitoring, EIA , IEE and in planning and reporting. He/she must communicate well (written and orally) in Lao and English.
Location:	Vientiane, Luang Prabang, Huaphan and Phongsaly
Responsible to:	Programme director, coordinator from WREA and the International Environment Specialist.

Background

1. Considering the rate and direction of development in the North of the Lao PDR, environment issues become unavoidable in order to secure and improve sound and sustainable livelihoods of the rural poor in the Northern Uplands. Investment projects will have important impacts on their livelihoods and their environment. It is thus imperative to raise awareness amongst the population and to set up measures to safeguard from adverse effects of development activities.

However, environment is a young field in the Lao PDR and Water Resource and Environment Officers at provincial and district levels need to be strengthened in order to efficiently perform their duties. The Programme will use the opportunity of activity implementation to build their capacity in EIA/IEE reviews, monitoring of environmental indicators and in planning and reporting.

Detailed Terms of Reference

2. The Environment Trainer will be responsible for:

(i) The coordination between the Programme, WREA and other Environment projects (in particular SEM II) in view to prepare the input of the International Environment Specialist;
(ii) Assist the International Environment Specialist in the preparation of training plans and materials;
(iii) Conduct training and on-the-job training of provincial and district WRE officers in EIA/IEE reviews, in the monitoring of environmental indicators and in planning and reporting under the supervision of the International Environment Specialist;
(iv) Assist and build capacity of PWREO in coordination and reporting with the Programme and in the follow up of DWREUs;
(v) Assessment of training and on-the-job training participants;
(vi) Reporting on each input.

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List of people met

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3. Mr. Andrew Bartlett, LEAP
4. Ms. Monemany Gnoybuakong, Chief of Cabinet, Department of environment
5. Mr. Somvang, Head of Public Investment, ESIA Unit, WREA
6. Mr. Ian Craig, Agro-Ecosystem Analysis
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9. Mr. Maykong Phonephommavong, Director, PAFO Huaphan and PAFO team:
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    - Mr. Somchan Phengphaxay, Deputy Director, PAFO
    - Mr. Vasanou, Deputy Head of Forestry
    -
10. DAFO Viengxay, Huaphan
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    - Mr. Amphay Phounmanola, Head Of Technical Unit
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    - Mr. Somchai Phommachan, Irrigation Section
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12. Mr. ____ , Head of Kumban Xieng Luang, Viengxay, Huaphan
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    - Mr. Phonethavy Sipaseuth, Administrative Director
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    - Ms. Phaysouk Phouthapanya, Forestry Officer
    - Mr. Phoneseng Tor Thai Jiaheu, Forestry Officer
14. Mr. Viengkeo, Head of Kumban Xonetai, Viengthong
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16. Mr. Chantha Xayavong, Head of Kumban Muang Kao, Viengthong
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18. Ms. Vongpheng Soukphengmuang, Director, DPI, Viengthong
19. Mr. Kae Phetdaraphone, Head of Commerce Division
20. Mr. Phonesy Thienglavan, Head of DLNMA
21. Ms. Sindavone Siouthai, DWREU Officer
22. DAFO Viengkham:
    - Mr. Bounthan Manivong, Head of Crops section
23. Mr. Onhta Vannachak, Director, DPI, Viengkham
24. Mr. Xayphone Chanthoumma, Director, District Administration Office

25. Mr. Phoumy Keovandy, Director, Technical Service Centre, Kumban Vangxieng/Phonethong
26. Naiban, Ban Done Ngern, Kumban Vangxieng, Viengkham
27. Mr. Bounthone Lorvanti, Village Chief, Ban Pounghone, Kumban Vangxieng, Viengkham
28. Group of villagers planting mai Liang for sticklac production, Ban Kang, Kumban Vangxieng, Viengkham
29. Mr. Sonephet, Stick lak Group, Ban Houaylek, M. Ngoy
30. DAFO Nambak, Luang Prabang:
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31. Mr. Phansouk Xayaseng, Deputy Chief, Ban Na yang Neua, Kumban Na Yang, Nambak
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34. Mr. Bounthanh Keobualapha, Deputy Director, PAFO Luang Prabang
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