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Asia-Pacific Network for Sustainable Forest Management and Rehabilitation

PROJECT PROPOSAL

Landscape Approach to Sustainable Management of Forests in Prek Thnot Watersheds

Institute of Forest and Wildlife Research and Development

31 October 2014

Project title	**Landscape Approach to Sustainable Management of Forests in Prek Thnot Watersheds**	
Supervisory agency	**MAFF**	
Executing agency	Institute of Forest and Wildlife Research and Development **(IRD)**	
Expected project duration: 01/01/15 to 30/12/17, months: 36		
Target area Kampong Speu Province in Cambodia (please see Annex 1 showing the relative location of Prek Thnot Watershed)		
Total budget(USD) **$573,015**	**Expected APFNet grant(USD)** **$499,215**	**Counterpart contribution (USD)** (in cash and in-kind) **$73,800**

Project Summary

Prek Thnot watershed is considered to be one of the high risks of impairment. Maintaining good forest cover is crucial for the effective functioning of the watershed. The project aims to contribute to the management of Prek Thnot watershed to sustain its supply of fresh water and protection to Phnom Penh and adjoining areas from natural disasters. The proposal aims to:

1. To build capacity and raise awareness on the concept of integrated watershed/landscape planning for central and local stakeholders through scientific assessments, analysis and participatory watershed/landscape planning processes.
2. To develop a watershed management plan of Prek Thnot watershed with participation of stake holders.
3. To share the experiences and lesson learned from the project to stakeholders.

The expected outputs of the project are: (1) improved knowledge and awareness of the target stakeholders on the concept of integrated watershed planning and the development issues in Prek Thnot Watershed that affect the forest-dependent communities; (2) enhanced capacity of the FA staff on participatory watershed management planning; (3) characterization of Prek Thnot Watershed; (4) socio-economic and biophysical information for Prek Thnot Watershed; (5) integrated watershed landscape development plan that are validated with the local authorities and keys stakeholders; (6) agroforestry demonstration Sites; (7) forest-based livelihood supported; and (9) a draft policy brief for the sustainable development of the Prek Thnot watershed landscape.

The project is expected to result to the following impacts: increased capacity of the selected FA staff for developing watershed plans and contribution to better governance of Prek Thnot watershed thru the development of policy briefs.

In order to achieve the desired outcomes, the following activities are proposed: (1) improving the knowledge and awareness of the target stakeholders on the concept of integrated Watershed Planning and the development issues in Prek Thnot Watershed that affect the forest-dependent communities thru consultation and awareness raising; (2) improving the capacity of the FA sub-national thru training; (3) characterization of Prek Thnot watershed; (4) development of the integrated watershed development plan thru participatory approach; (5) pilot the agroforestry development; (6) pilot a forest-based

livelihood development in the selected community forestry sites; and (7) development of a policy brief that will support the sustainable development of Prek Thnot watershed landscape.

This project is in line with the APFNet's 2014 priorities. There are three priority areas of the APFNet that this proposal aims to address: (1) Demonstration of sustainable forest management model: *this can be achieved in this proposal through integration of optimized land allocation models and participatory watershed planning; (2)* Forest rehabilitation and sustainable management for climate change adaptation: *this is addressed through the establishment of trial Agroforestry sites using; (3)* Community based forest resource management and rural development: *this is addressed by integrating CBFM in watershed landscape development.*

The project is also in line with the National Forest Programme of Cambodia. The NFP 2010-2029 aims to develop 2 million hectares of forests that will be managed under community forestry. One way to achieve this target is by seeking wider involvement, particularly the communes, in the development and management of the forest resources. The development of the Prek Thnot watershed landscape is also in line with the objective of the government to address climate change adaptation while addressing poverty. The Law on Water Resources Management of the Kingdom of Cambodia also provides for the need to adopt an integrated water resources management (IWRM) (Article 4) including the management of the watershed runoff (Article 10).

The beneficiaries of the project will be the communities living within Prek Thnot Watershed (representing the upper part and lower part of the watershed. The project aims to provide a judicious use of the watershed that will maximize the productive and protective function of the watershed landscape. This can be achieved thru a systematic approach of planning the watershed. The integrative landscape planning approach will be conducted thru consultations.

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Abbreviations and Acronyms

APFNet	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation
CBFM	Community-based Forest Management
CCF	Conservation Community Forestry
CF	Community Forestry
CLUP	Commune Land Use Plan
CPA	Community Protect Areas
ELC	Economic Land Concession
FA	Forestry Administration
IRD	Institute of Forest and Wildlife Research and Development
IWRM	Integrated Water Resource Management
MLMUPC	Ministry of Land Management Urban Planning and Construction
MoE	Ministry of Environment
NFP	National Forest Programme
NGO	Non-Government Organization
PFE	Permanent Forest Estate
RUA	Royal University or Agriculture
SLM	Sustainable Land Management

Project Details

1.0 Background and Context

1.1 Context

Prek Thnot watershed covers the provinces of Kampong Speu and Kandal and Phnom Penh, the Capital City of Cambodia, although the project will limit only in Kampong Speu province. The upstream part of Prek Thnot watershed are located in Kampong Speu province and play a very important role in in providing ecosystem goods and services and support the livelihoods and production systems of the downstream communities. The entire watershed partly or entirely covers approximately 65 Communes, and six Districts. The downstream part is located in the southeastern part of the watershed where most of the residential areas are located. This part is highly urbanized and the most are vulnerable to erosion and flooding. The study by Easton *et al.*, (2010) demonstrated that soil erosion by water represents a major threat to the long-term productivity of agriculture. It is estimated that a typical hill watershed losses between 1-2 mm of soil depth per year contributing a total sediment of 21 t/ha/year (APROSC, 1997, cited by Thapa, 2005). The risks to flooding increase as surface runoffs increase due to deforestation in the upland areas. Forest areas in the study area have an infiltration rate of about 100 mm/ha while agricultural land planted with corn and vegetables with and without soil conservation intervention have an infiltration rate of 60 mm / ha and 17 mm / ha respectively (Paningbatan, 2005 cited by Alibuyog *et al.*, 2009).

The watershed has both production (managed by the FA) and conservation forests. The conservation forests are managed by both the Forestry Administration (Protected Forests) and by the MoE (Protected Areas) (please see Annex 2). Within the production forests, the Royal Government of Cambodia awards communal tenure to the communities in the form of Community Forestry for a period of 15 years renewable for another 15 years. This modality is being enjoyed by the community and has proven to be very successful in the conservation of the forest. Community forestry is not only undertaken by the community. However, securing forest areas for community forestry is not quite easy due to some technical requirements. But one of the main constraints in the establishment of community forestry is the availability and suitability of areas for community forestry. The identification of areas for CF development is oftentimes not done systematically. There are many instances that the areas identified for CBFM are in conflict with ELCs one of the important stakeholders in Prek Thnot. In Prek Thnot watershed area, one CF is located in the Protected Forest.

It is very common that ELCs or mining companies are located in conservation forests or in forest areas that serve as sources of livelihoods of the communities. Land conflicts can be minimized of a land use plan at the landscape level that guides resource managers where to locate the different development projects (e.g. ELCs, CFs/CPAs or allocation for conservation). Moreover, without an overall land use plan, the granting of lands for ELCs are very prone to abuse, usually disregarding the suitability of the introduced development to the condition of the suite. This will ultimately affect the lowland communities, the main recipient of the negative externalities in the upland. With the diverse demand for watershed services, finding an optimal allocation of the land is needed in order to account the biophysical constraints of an ecosystem. How the watershed landscapes will be allocated depend largely on the background and preference of the sectors. For the Agriculturists, more lands should be allocated to crop production (to address food security and economic land developments); for the environmentalist, more area should be developed for conservation; and for the Foresters, the watershed area should be developed for conservation forest. Satisfying the conflicting demands is indeed complicated and it is further complicated by the need for the land use plan to meet the biophysical and social constraints.

1.1.1 Biophysical Condition of Prek Thnot Watershed

Most of the forest cover of Prek Thnot watershed is found in the northwestern part although few patches of forests could still found on the downstream part (Annex 2). Conserving the forests upstream is very critical since the rivers and surface runoffs drains towards Phnom Penh (Annex 1). In many estimations in various watershed estimates high surface runoff and sediment reaching as high as 200 ton/ha resulting from cultivation on the steep slopes (Easton *et al*., 2010). At the southeastern part of Prek Thnot watershed also locates some rice producing areas that depends on the water coming from the tributaries of Prek Thnot (Annex 3). The drying up of the headwaters due to deforestation and land conversion will expectedly affect rice productivity and increase flooding, pollution, and loss of life and property downstream (Thapa, 2005) due to the sediments. Unfortunately, in the areas where most of these headwaters are located is also the site of most ELCs (Annex 5).

1.1.2 Socioeconomic Condition

A raster model of poverty was derived from the poverty maps developed by JICA. From the map, it was seen that poverty is located mostly in the northernmost part of Prek Thnot watershed (Annex 4). By superimposing these with the forest cover, it can be noticed that in areas where poverty is prevalent, forests are also relatively abundant although the deforestation is also high.

1.1.3 Issues and Problems

Prek Thnot is one of the watersheds that have the high risk of impairment of its watershed function (Hou *et al*., 2004). The loss of forest cover can greatly diminish the protective role of the watershed and increase the vulnerability of the downstream communities. The ongoing deforestation in the uplands increasingly subjects the downstream communities like Phnom Penh to flooding. The study of Alibuyog et al. (2009) indicated an increase of 15% to 32% in runoff volume occurs when the whole sub-watershed is converted to agricultural land. The higher value indicates a condition of the watershed without soil conservation intervention. About 39% to 45% of the mean annual rainfall is likely to be lost as surface runoff. Converting the watersheds to agricultural lands is likely to increase the sediment yield to 60 t/ha/year (Tripathi, 2005). In some areas, the variability of soil erosion could be very high ranging from as low as 16 t/ha/year to as much as 300 t/ha/year (Easton *et al.*, 2010). There is no study of the runoff in the Prek Thnot watershed, but the current situation of Prek Thnot watershed could seriously affect the socioeconomic condition and decrease of the protective function of the watershed. The unsustainable use of the watershed and some developments will breach the threshold carrying capacity of the watershed resulting to negative environmental impacts (Figure 1). Such conditions will cause significant soil erosion, depleting soil nutrients, sedimentation of reservoirs, and flooding of low lying areas at the downstream (e.g., Alibuyog *et al*., 2009). The eroded sediment may also adsorb and transport agricultural contaminants such as pesticides, phosphate and heavy metals posing serious threat to aquatic life (Ella, 2005 cited by Alibuyog *et al*., 2009) and may create health problems for farm families and those living downstream. These results can impact the wildlife and fish in the streams and also the water supply of the watershed especially during dry periods (Alibuyog *et al*., 2009). Prek Thnot is facing threats from:

- Unabated logging of the forest areas, particularly those adjacent or within the Cardamom Mountains.
- Fuelwood and charcoal industry. The forests in Prek Thnot watershed are major source of wood energy for Phnom Penh and nearby provincial towns.
- Expansion of farms and agro-industries. The poor soil conditions of many small

holder farms and ELC contribute to soil erosion.

- Settlers migrating from the nearby districts within Kampong Speu province and from other provinces.

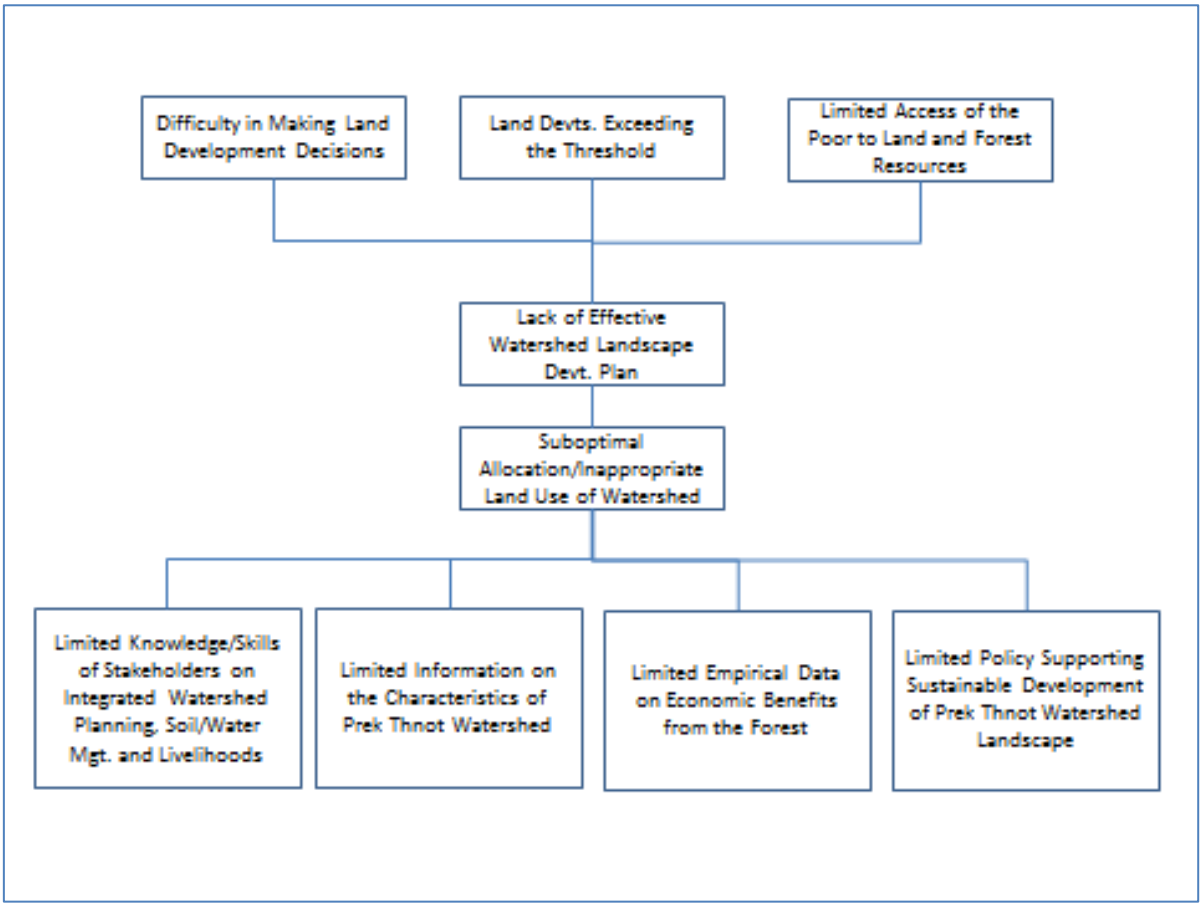

Figure 1. Problem Tree

Alibuyog *et al.* (2009) estimates that efforts should be exerted to improve present crop cultural management practices of farmers and train them to employ soil conservation practices to reduce soil erosion rate, thereby rehabilitating and sustaining the whole watershed. Areas with high forest cover or when trees are combined with an annual crop are better protected against soil erosion (Gebel *et al*., 2014). Given the existing conflict between watershed conservation and livelihood development of locals, agroforestry activities will be a proper way to balance the two elements. Improving land use planning could address the environmental issues in Prek Thnot watershed. Under proper land use planning, sustainable land uses can also be introduced in critical areas. For instance, under a 'no-tillage scenario' soil erosion and sediment input from all cropland could be reduced from 9,272 to 2,620 ton/ha/year (Gebel *et al*., 2014). Forest vegetation dissipates raindrop energy; retards surface runoff velocity, increases evapotranspiration rates, and increases the soil organic matter, all of which lead to greater infiltration and lower surface runoff (Schwab *et al*., 1992 cited by Alibuyog *et al*., 2009). The land use plan aims to provide a means of optimizing the generation of benefits thru holistic approach in planning the watershed landscape, in contrast to fragmented planning, and helps the Commune Council in developing their commune land use plans (CLUPs). The project helps in allocating the land in the watershed landscape to meet the demand of the watershed services giving due consideration on its carrying capacity. Under a diverse and often conflicting demand for watershed services, finding an optimal allocation of the lands that is economically feasible, socially acceptable, and environmentally feasible is very challenging. In this situation, a consensus or tradeoffs of benefits and watershed services can be balanced by employing mathematical models combined with

spatial tools like GIS. The model, however, needs to be based on consultation with the stakeholders and take into account the biophysical constraints (existing land use, topography, forest cover, soil, legal classification, etc.).

1.2 Relevance of the Project

A paper prepared for World Bank recognize the need for a national legal and spatial planning framework for allocating forest resource and land use, and the need that forestland be comprehensively and rationally allocated in order to create a spatial framework within which to allocate forestland for community forestry, timber production, protection, conversion to other uses, and smallholder settlement. The efficient allocation of watershed landscape also has the potential benefits of addressing conflicts and poverty issues. The concerns of the different sectors have to be addressed in the optimal land allocation thru consultations and taking into account various land use options (Shanthikumar, 2002).

This project is in line with the APFNet's 2014 priorities. There are three priority areas of the APFNet that this proposal aims to address:

1. Demonstration of sustainable forest management model: *this can be achieved in this proposal through integration of optimized land allocation models and participatory watershed planning;*
2. Forest rehabilitation and sustainable management for climate change adaptation: *this is addressed through the establishment of trial Agroforestry sites;*
3. Community based forest resource management and rural development: *this is addressed by integrating CBFM in watershed landscape development and trial of forest-based community enterprises.*

The project is also in line with the National Forest Programme 2010-2029 of Cambodia aiming to place 2 million ha of forests under the management of local communities. One way to achieve this target is by seeking wider involvement, particularly the communes, in the development and management of the forest resources. The development of the Prek Thnot watershed landscape is also in line with the objective of the government to address climate change adaptation while addressing poverty. The Law on Water Resources Management of the Kingdom of Cambodia also provides for the need to adopt an integrated water resources management (IWRM) (Article 4) including the management of the watershed runoff (Article 10).

Having a landscape-level land allocation plan will also provide a framework of how the different communes can develop (or modify) their CLUPs that will contribute to the overall effective ecosystem functioning of the watershed. The watershed landscape plan can also provide a basis for the decision makers and investors (ELCs including the communities) where to locate their investments without impairing the landscape. More importantly, the project could further strengthen the implementation of the Land Law (2001) and the Forestry Law (2002). The NFP on the other hand aims to provide basic data and legal foundation necessary for the ecological, social and economic conservation and management of the country's Permanent Forest Estate (PFE). The optimal allocation of the watershed areas will support and strengthen the implementation of the NFP as well as the exiting Guideline on CLUP.

1.3 Strategies, Methodologies and Approach

1.3.1 Use of Scientific Approach

The conflicting interests among the stakeholders resulted to the complexity of land allocation in the watershed. To harmonize the conflicting uses and preferences of land use, a

systematic tool will be used that will optimize the benefits and at the same time take into account the biophysical constraints and carrying capacity of the watershed ecosystem.

The project will develop a watershed management plan based on optimized land allocation. Empirical data generated from the pilot agroforestry sites, socioeconomic survey and stakeholder consultations will be used in validating some assumptions the model. The result of the entire process will be presented to the stakeholders thru a forum to raise their awareness on the needs and benefits of land use planning at the watershed landscape. The feedback from the different stakeholders and the lessons learned from the consultations will be synthesized to come up with a policy brief that will further strengthen the land use planning of the watersheds in Cambodia. The development of the land allocation will consider the carrying capacity of the watershed. The project will use Linear and Goal Programming in setting of the carrying capacity of the watershed and in optimizing the land allocation of the watershed.

1.3.2 Multi-stakeholder Consultation

The development of the watershed management plan will consider inputs from the different stakeholders of the watershed and incorporated in the land allocation model. Multi-stakeholder consultation will be one of the hallmarks of this watershed planning exercise. The stakeholders to be consulted and who will be potentially affected by the land use plan are described in Section 4.0. The consultation will target the Community Forestry/CFMC members and the Commune Councils, representative of the ELCs, and Fishing Community. The selection of CFs to be consulted will be geographically distributed in the watershed landscape. The same will be done in selecting the Commune Councils. Representatives of the ELCs will also be invited in the consultation meetings. The selection of fishing community to be invited will be based on the recommendation by the Fishery Administration.

1.3.3 Empirical Data Testing of Assumptions

The optimum land allocation of the watershed is mainly based on the economic benefits that a land use can provide to society (either apparent cash benefits and/or valued of ecosystem services). Overstated economic benefits of a particular land use may favor land allocation on that particular land use and conversely, understated economic benefits may disenfranchise a particular land use from the allocation exercise. Moreover, without considering the impacts (soil erosion and increased runoff) from cassava, sugarcane and other agro industrial developments of the Economic Land Concession may heavily favor ELCs in the land allocation (since these land uses will provide higher income than conservation). This project therefore endeavors to ensure that the assumptions in the land allocation models are reflective on realities in the ground. Particularly, the empirical data gathering will focus on soil erosion from farming and agroforestry activities, and the potential income from community forests. These aspects are considered highly variable and needing empirical testing. The data that can be collected will also be used in the dissemination of information to the different stakeholders (especially the farmers and decision makers) who are de facto resource managers of the land in Prek Thnot watershed.

Some of the assumptions used in the model (economic benefits and erosion) will be compared and adjusted based on the empirical data (on soil erosion and economic benefits) generated from agroforestry and community forest enterprises. Two Agroforestry sites and one CF will be established for soil erosion and economic benefits studies respectively. Actual experiments are needed since secondary data or information might inadequately reflect the real situation in the area.

Two farmer cooperators who are willing to participate in the case study will be selected for agroforestry development. The agroforestry sites will be located representing a sloping land to monitor the erosion rate. Soil erosion control measures such as hedge rows and some cultural practices will be introduced (e.g. plowing along contours). The agroforestry sites will be established along the road where some of the farmers can see and may increase the chances of replicating.

The stakeholders' role of the project is to provide the necessary information and ideas on the priority developments of Prek Thnot watershed. Thru consultations, the participants will provide additional information that will be used in planning.

Mathematical modeling can only be reliable depending on the quality of data that will be used in building the model. In the case of Prek Thnot watershed, the allocation models will depend largely on the collected field data. While there is information that can be collected from literatures, site-specific data will provide more realistic results. In this project, the identified agroforestry sites will be used as case studies to generate information/data that will be used in validating the allocation models. The established agroforestry plots will be continuously monitored for the infiltration rates of the areas developed for and the overall improvement in farm production. Included in the monitoring will be the evaluation benefits of agroforestry to the farmers in terms of farm income that will be used in the allocation model.

1.3.4 Community-based Enterprise and Benefit Sharing

The livelihood will be piloted in a CF where there is a potential for forest product to develop. As much as possible, this CFs should have already existing internal regulations or approved CF agreements. The FAC will be consulted in the selection of cooperating CFs. The net benefits from raising of edible ants will comprise part of the other benefits that the community forest can provide. The environmental benefits (water, control of soil erosion, ecotourism, carbon sequestration, etc.) will also be considered on the overall valuation of the community forests. Estimates from other benefits will be drawn from the PRA and socioeconomic survey. The information regarding the potential benefits from community forest will be used in adjusting the land allocation model.

The selected CF will also test the potential of running a community-based enterprise in the community forest. To ensure success, the community will prepare an enterprise development plan. The plan will guide the community on the operations and marketing of their products and the projected cost and befits. The plan will also detail the schedule of the fund requirements. The enterprise plan will likewise detail the mode of sharing among the members. The initial consultation with the CF leaders, they indicate that 95% of the benefits that will accrue to the identified enterprise (ant raising) will accrue to the participating members. The remaining 5% will go to the common CF funds. The FA subnational also indicated that except for timber, the FA allows the community to keep all the benefits from NTFP (including the proceeds from ant raising). The sharing mechanism will be reflected in the enterprise development plan after consultation with the members of the community.

2.0 Vision, Goals and Objectives

Vision

The ecosystems of Prek Thnot watersheds are protected, restored and sustainably managed towards healthy conditions, providing multiple ecosystem services for the residents within the watershed and downstream. By providing a healthy and safe water source for agriculture, forestry and people as well as better satisfying living condition, people thrived in harmony with

nature, people and nature reached mutual development and improvement.

Goal

The goal of this project is to improve the ecosystem services (balanced watershed ecosystem services and socio-economic development) of Prek Thnot Watershed Landscape thru judicious land use planning and wider participation of different stakeholders on integrated watershed management.

Objectives

The objectives of this project are as follows:

1. To build capacity and raise awareness on the concept of integrated watershed/landscape planning for central and local stakeholders through scientific assessments, analysis and participatory watershed/landscape planning processes.
2. To improve the integrated management of Prek Thnot Watershed with participation of stake holders.
3. To share the experiences and lesson learned from the project to relevant stakeholders.

3.0 Outputs and Strategic Activities

Output 1.1 Improved knowledge and awareness of the target stakeholders on the concept of integrated Watershed Planning and the development issues in Prek Thnot Watershed that affect the forest-dependent communities

Activity 1.1.1 Map out critical areas in Prek Thnot watershed that provide substantial irrigation water to agricultural land and identify priority areas for forest-dependent communities and habitat for wildlife.
The mapping of the watersheds will be done thru GIS. The critical areas will be identified based on the predetermined criteria, such as slope, proximity to the ecological bodies, areas designated as conservation area by FA and MoE, and even by the communities and local authorities, etc.

Activity 1.1.1.1 Assess the training needs and provide trainings to FA staff and farmers.
Capacity building and training of trainors (TOTs) will be provided to the FA central and sub-national staff (FA Cantonment and Divisions) on GIS, agroforestry, facilitation and participatory research. The trained staff will be responsible on producing maps during the planning process. Ultimately, the trained FA staff will implement participatory data collection in the field. The sets of training to be conducted include: (1) facilitation, participatory mapping/planning (GIS), monitoring/data collection); and (2) Training of 10 farmers on agroforestry technologies, hydrologic monitoring and participatory action research. A trainor will be hired to conduct the training.

The project will endeavor to build the capacity of the IRD staff and selected national and sub-national FA staff. The capacity development will target the junior staff at the national level and the key personnel at the FA sub-national on the areas of participatory watershed planning. The CF members will also be trained on the agroforestry, livelihoods, facilitation, hydrologic measurements, livelihoods and participatory land use planning. The skills on these aspects will be critical on the development of the watershed management plans.

Activity 1.1.1.2 Collection of base maps and pertinent data of the watersheds (Land Use/vegetation Cover Maps from Secondary Data, Satellite Image Analysis and social economic data).
The Project staff trained on GIS will compile base maps (biophysical and socioeconomic maps). Preliminary spatial analysis will be conducted to analyze the site suitability of the different uses.

Activity 1.1.1.3 Preparation for consultative meeting activities. Preliminary visits or consultation will be made to the national offices or Ministries to get information of the contacts from the subnational offices. Ocular inspection or verification may be conducted in the field together with the field staffs to initially meet the contacts and establish initial linkage with the local authorities, the potential stakeholders who may be involved in the consultative meetings.

Activity 1.1.1.4 Conduct consultative meetings on integrated watershed planning with participations of stakeholders to map out the critical priority areas.
Participants may include representatives of local authorities at different levels in Kg. Speu province, relevant departments under provincial authority (such as Dept. of Land Use Planning, Dept. of Irrigation), ELCs, NGOs, FA sub-national offices, CFs and Communes (two with CLUP and two without CLUP). This is one of the important activities, and the first step toward planning for management of Prek Thnot watershed. The concept of integrated watershed planning will be presented to the stakeholders followed by the general introduction of the current situation of Prek Thnot. Then the participants are grouped (for examples, local government agencies, communities and ELCs) and asked to define the challenges in the management of Prek Thnot, and suggest the recommendations to solve the problems. The participants' point of views will be synthesized to stress the need to effectively managed Prek Thnot watershed.

During the consultative meetings, the criteria of the land uses will be formulated and will be decided by the stakeholders. For instance, the group will provide suggestions the criteria for protection areas, for forest production areas, areas ideal for community based forestry and the buffer zones, etc.

Activity 1.1.2 Develop a land use plan for the Prek Thnot watershed and critical priority areas to engage the stakeholders in the mapping and assessment processes and wrap-up results to inform concerted support and leverage greater actions from the stakeholders.

Activity 1.1.2.1 Spatial Land Allocation Mapping. From the criteria and consultations, the land allocation maps will be generated for consultation with the various stakeholders.

Activity 1.1.2.2 Conduct provincial stakeholders forum to present the result of the preliminary land allocation and draw action plan for the development of Prek Thnot Watershed Landscape. The forum will be participated by the Local Authority (province, district, commune and village), CBOs, relevant NGOs, FA and relevant Authorities.

Output 1.2 Watershed characterization report of Prek Thnot Watershed

Activity 1.2.1 Preparation for watershed characterization activity. The project staff will start establishing contacts to the project site, and organize meetings with the subnational staff. The latter will initially meet with the other subnational offices to arrange for the meetings with the national project staff's meetings. Other base maps will be printed out to be used for the participatory mapping.

Activity 1.2.2 Conduct bio-physical, socioeconomic survey and risk assessments to the critical priority areas (may include 30 villages in the target Communes in the districts of Thpong, Samraong Tong, Phnum Sruoch and Aoral).
The planning of Prek Thnot watershed needs a systematic and scientific approach. Development and allocation will give considerations to the biophysical constraints and carrying capacity of the watershed. In formulating the land allocation plan, geospatial tools such as Linear and Goal Programming and GIS will be used.

The outputs under this exercise are suitability maps, priority areas for conservation and preliminary allocation based on the model.

Output 2.1 Integrated watershed landscape development plan for Prek Thnot Watershed developed

Activity 2.1.1 According to the mapping and assessment, develop participatory landscape restoration and sustainable management strategies and action plans for the identified critical priority areas. The critical areas will include the areas that are vulnerable to erosion, priority for conservation (e.g. habitat for wildlife, supports the microwatersheds, historical sites, etc.). The identified allocation will take into considerations the conservation needs and support for economic development. The plan will ideally include the following aspects:

1. Ecosystem restoration of the catchment/sub-basins according to landscape principles and expected ecosystem services, such as land use optimization, natural vegetation protection, forest restoration, and farmland management etc.;

2. No. of river basins proposed for protection and restoration towards better water security and ecosystem services;

3. Areas in the pilot sub-basins proposed for restoration, protection and sustainable management for the benefits of both nature and people;

4. Community-based sustainable resource management including alternative livelihoods, agroforestry, sustainable agriculture, forest-based enterprise development and ecotourism etc.; and

5. Supporting measures and mechanisms from stakeholders such as integrated watershed management arrangements, stakeholder capacity building and awareness raising.

Output 2.2 Two demonstration sites on agroforestry system, contributing to soil and water conservation and livelihoods established

Activity 2.2.1 Preparation activities for the AF Site developments. The project staff will start relaying to the sub-national staff for organizing the AF site developments, specifically the design of the AF and contractual agreements with farmers. The Project staff will conduct a farm planning session (the most important of the AF development). A sketch of the area will be developed and will indicate where to develop and what plants (trees and agricultural crops) to be planted. The establishment of the AF site will be attended by the local authorities (village and commune heads), as they have to witness the agreements with farmers, and some selected farmers to present the AF model that will be implemented. This will require some coordination with the local authorities. The outputs of this activity (designs and agreements) will guide the actual AF development (Activity 2.2.3).

Activity 2.2.2 Identification of two agroforestry sites/farmer cooperators.

A formal agreement will be entered with the farmer cooperators to implement this project activity. The agreement will formalize the cooperation of developing their farms as research sites for agroforestry. An improvised rain gauge and soil collection pan will be installed in the agroforestry sites.

The agroforestry sites will provide empirical data that will be used in the allocation model on the level of erosion that will be contained by agroforestry technology. The constraint considerations of the land allocation model will consider the level of erosion of an improved system. The following criteria will be considered in selection of the agroforestry sites:

1. Safety of the site is the first consideration when locating the agroforestry sites. The project team will be working with farmers, rather than with government agency on state land, that have a clear land owner who will collect the data throughout the project time frame.
2. The willingness to cooperate by farmers. It is the farmers that will maintain the sites and do data collection. The project staff at the FAC/FAD will assist the farmers in the collection of the data.
3. As the main objective of the agroforestry sites is to measure soil erosion, it is important that the sites have to be located in sloping areas, preferably on sandy soil.
4. At the same time, the sites will serve as a showcase to other farmers on the sustainable agricultural practices. It is important therefore that the agroforestry sites will be located along the roads where they will be visible and accessible to the public.

Activity 2.2.3 Establish regular soil and hydrological monitoring systems and measures, and based on regular monitoring and periodic assessment, analyze and communicate the results to stakeholders.

The results will be collated and analyzed by the Consultants (Hydrological Experts and International Consultants). The results could be used in land allocation model establishment in the future. The AF farmer cooperators will be trained to do the data gathering by the Project Staff. The activity will include: (1) on-site development of agroforestry system including installation of rain gauges and erosion monitoring plots; (2) collection of data (hydro meteorological and soil erosion data) from runoff plots; (3) outcome from enterprise development; and (4) capacity development.

The set-up of the agroforestry including the layout and species to be planted will be discussed in detail in the annual work plan.

Output 2.3 Forest-based community enterprise supported

Activity 2.3.1 Preparatory activities for Participatory Rural Appraisal (PRA) and forest-based enterprise development.

The enterprise development will be implemented in Damrey Chak Thlork CF. The CF has a considerable large area (about 1,500 hectares) of forests with clearly marked boundaries. It is not in a remote area, and is easy accessible all year round. There is no conflict of land use inside the CF. Although there are some illegal cuttings inside the CF, these have been put under the control. The CF is legally secured through agreement with the Kandal Forestry Administration Cantonment. The members of the CF are relatively active, and they have been successfully conserving their community forest for more than 10 years. With these characteristics, Damrey Chak Thlork is ideal for the showcasing of community-based enterprises. The preparatory activities will include scoping and consultation of the potential enterprises that the community would like to develop.

This activity will focus on validating with the community on their interest on the community enterprise that was identified by the CFMC members (determined during the visit by the APFNet Mission). The validation will be a formal way of ensuring commitment from the community members, and to explain to them the purpose of the grant, the benefit sharing that they prefer, the auditing procedure and the committees they will create, among others. The session also aims to determine alternative community enterprise option in case the feasibility of the ant raising project will not be feasible based on the study conducted by the consultants (in Activity 2.3.2).

Activity 2.3.2 Conduct PRA for Potential Enterprises.

The PRA will describe the resources present and the market condition of the planned enterprises in the CF. Initially, the community members initially identified the raising of edible ants as the livelihood enterprise. An assisting institution (an NGO like IDE, EDI, CEDAC, NTFP-EP or a Consultant that will be commissioned later) that has the experience on enterprise development will be commissioned to conduct the study and to provide the technical assistance in developing the enterprise plan. The institution that will be contracted by the project will be mainly responsible in providing assistance to the community in developing the enterprise development plans. The PRA stage will have more in-depth study of the market of the potential product that the community will implement.

Activity 2.3.3 Writeshop planning for the forest-based enterprise in a community forest.

A Community-based Enterprise Development Plan will be developed for the enterprise (i.e. Ant Raising enterprise or any enterprise) identified and agreed by the community. This is to serve as guide of the community in running their community enterprise. The formulation of the enterprise development plan will be done in a participatory manner. Community involvement in writing the plan will ensure sense of ownership among the community.

Activity 2.3.4 Implementation and monitoring of the forest-based enterprise in a community forest. The developed enterprise plan will then be implemented by the community themselves. A seed grant of $5,000 will be provided to the community to run their enterprise. The release of the seed grant will depend on the planned expenses.

Output 3.1 Project success and experiences disseminated and policy briefs for the sustainable development of the Prek Thnot Watershed submitted to relevant authorities

Activity 3.1.1 Develop knowledge and communications products (Proceedings and Lessons, and Policy Brief.

Activity 3.1.1.1 Compilation of the proceedings and lessons learned

All the lessons learned will then be compiled and synthesized as information materials for dissemination to the wider audience. The Proceedings/Lessons Learned will reflect the best practices from the case studies

Activity 3.1.1.2 Drafting of a Policy Brief on sustainable development of the Prek Thnot Watershed

Policy Brief will contain the recommendations based on the experiences from the pilot sites. The recommendations and strategies will be circulated at various levels to ensure adoption of best practices from the project. In addition, the Policy Brief that will be developed will highlight the different recommendations to promote the sustainable

management of the forests in Prek Thnot watershed and submitted to relevant authorities.

Activity 3.1.2 Organize and launch nationwide campaign to raise awareness among the public, particularly residents in the provincial town and countryside on integrated watershed/landscape management and restoration, to leverage greater support to project initiatives and recommendations, and to enhance brand recognition of all participation organizations. This will be done thru a national forum, posting the project on the websites, development and distribution of information leaflets. The forum will be organized by the project staff together with the Consultants.

Gathering support from the different key players in Prek Thnot watershed depends on their level of awareness on the watershed issues. The target for awareness raising will be the land developers (CFs, CPAs, ELCs or farmer organizations), the commune councils who represents the community stakeholders, the local FA, the local authorities (District and Provincial Government), and the environmental NGOs (both local and international). The awareness raising will focus on the current conditions of the watershed (forest cover, land uses, perceptions of the stakeholders, the benefit of landscape planning, and the result of the land allocation. As soon as the Watershed Management Plan is done, these will be presented again to the stakeholders to validate the outcome of the watershed planning exercise.

One of the outputs of the project is a policy brief that improves the planning of the watershed that include the best practices that needs to be replicated in the development of the watersheds. Draft policy brief will also provide some analysis on the shortcomings of the existing laws governing the watersheds and areas needing improvement. The draft Policy Brief will be presented in a forum together with the concerned government agencies and also discuss ways of improving the coordination and complementation among the different stakeholders and key players in the watershed.

4.0 Stakeholder Analysis

The project will have impact to the forest based and non-forest-based farmers, Commune Councils and local authority, the Forestry Administration, the wider society and residents of Phnom Penh, and even the concession developers. The stakeholders will be affected either by changing their practices and development approaches of the land that they manage or occupy, influencing in the development priorities (in the case of decision makers), or benefiting from the tenurial development and positive externalities of the watershed such as protection from flooding. How the project specifically affects the different sectors is presented in Annex 11.

5.0 Assumptions and Risks

Anticipating the expected risks that the project will potentially encounter and prescribing actions to deal with these risks can minimize the possible disruptions of the operations and ensure higher degree of success of the project implementation. The anticipated risks and how these will be dealt with is presented in Annex 12.

6.0 Management Feasibility

The project will be implemented by the IRD. The Institute is mandated by the Royal Government of Cambodia, particularly, under the NFP to be the primary agency to conduct researches related to forestry and natural resource management. The office has conducted

several researches and managed number of projects, funded by the government, the donors and financial institutions such as ADB, Korean Forest Service, JICA, and APFNet, among others.

6.1 Organization, Human Resources and Capacity Assessment

The Institute is manned by highly trained staff and specialist who were educated overseas. The Institute will be working in collaboration with the FA cantonments and the local governments (at the Communes, Districts and Provinces) in the field. Farmers still has to be selected to be partners for participatory research. The Institute will also work with other agencies such as the MLMUPC for the exchange of information on the land use plans of the target communes and the NGOs who are working on natural resource management in Prek Thnot watershed. The NGOs whom to collaborate will be identified during project scoping and field data collection. Coaching and mentoring will be conducted with the FA sub-national staff on data collection as well as on the technical aspects of spatial analysis and watershed planning. The organizational structure of the project is presented in Annex 6. The organization structure also links the project to the different stakeholders of the watershed. The different roles and responsibilities of the staff to be hired or involved in the project are shown in Annex 13.

6.2 Communication and Coordination Mechanism

All external communications coming from the stakeholders and donor (APFNet) will be channeled thru the Project Director who will be directly supervised by the Forestry Administration. He will also be directly answerable to the Auditors who will monitor the financial expenditures of the project. The Project Director, though performing oversight function, will exercise general supervision of the project. General instructions will be given to the Project Coordinator for the latter to implement.

The Project Coordinator will directly report to the Project Director for all concerns pertaining to the implementation of the project. He will likewise deal with the Consultants (International, Agroforestry and Watershed/Hydrology Consultants) that will be recruited. He will also be responsible in carrying out all instructions from the Project Director, in coordination with his Project Team (Admin/Finance Officer, Project Support Staff, Database Technician, and GIS Technician) and the Consultants. The Project Staff will coordinate with the programs at the national level and the Field Staffs. The Provincial Coordinator will receive instruction from the National Project Coordinator in implementing the plans and targets and may channel his concerns thru the Project Support staff. The Provincial Coordinator will also provide guidance and instructions to his Field Staff to carry out the instructions and work assignments. The field Staff will liaise with the Farmer Cooperators and Commune Focal Persons in the field. The field staff will receive instruction from the Provincial Coordinator. He will also be responsible in the collation of field data and will submit to the Provincial Coordinator. Both the Farmer Cooperators and the Commune Focal persons will provide the information to the Field Project Staff. Among the information include secondary data, maps, and biophysical information of the respective communes.

In the course of implementation, IRD will see to it that all the activities in the work plan will be implemented according to schedule. Regular coordination meeting will also be conducted with the project staff to keep track on the progress of implementation as well as get feedback for any issues from the field. In this manner, issues can be immediately corrected at their nascent stage.

6.3 Strengths and Weaknesses of IRD

The IRD was established by the Royal Government of Cambodia composed of highly qualified and dedicated professionals in the field of forestry. The institute is also mandated to lead in the conduct of research that will promote the sustainable development of the forest resources that would result to the efficient use of the forest resources and contribute to reducing poverty. Table 4 shows the analysis of the strengths and weaknesses and the strategies of enhancing or mitigating these factors to achieve the goals and objectives of the project.

7.0 Budget, Funding Resources and Financial Management

7.1 Total Budget Need

The project needs a total budget of USD **573,015** to cover the three year operation. The budget is broken as follows:

APFNet	USD **499,215**
Counterpart	USD **73,800**

The counterpart fund will be provided by the Royal Government of Cambodia (RGC) in the form of in-kind contribution .

7.2 The Budget Line Items

Among the important budget line items to be funded by the project include the Personal Services, the budget for the international consultants, the purchase of vehicles, and seed fund for the livelihood project of the communities. Among the important cost component of the project are the following:

1. **Project Staff**. The project will be implemented by the staff of the FA and some personnel to be recruited as full-time staff of the project. The part time FA Staff will be provided supplemental salaries for the extra tasks that they will perform and supplement the meager income of the government staff. It is expected that they need to perform the tasks during weekends and extended working hours, although a certain percentage of their time will be dedicated to the project. Some of the salary of the project staff serves as in-kind contribution of the FA.

   The Project will tap the Sub-National Staff and representative from the Local Authority (See Annex 6).

2. **Admin/Finance Officer**. The project will need an Admin/Finance Officer who will focus on the personnel management and to look after the financial disbursements. The Admin/Finance Officer will use the existing staff of the FA. This is to ensure the safety and accountability of the financial resources. The Admin/Finance Officer will receive a modest salary of $300/month to compensate for the extra effort for the project.

3. **International Consultant (Technical Adviser)**. An International Consultant will be hired to provide the technical support in the implementation of the project. Among the services that the consultant will provide include developing mathematical models on land allocations, spatial analysis, and land use planning, providing analysis, reporting and guiding the Project Staff on participatory watershed planning. The consultant will

work part time and he/she will be paid at a rate of $300/day. She/He will be contracted for 3 years (the duration of the project) and the days he/she will work will be determined depending on the schedule of project activities.

4. **Contract Costs for Local Experts**. The project will commission local consultants/experts on hydrology, livelihoods, agroforestry and in participatory land use planning. They will serve as resource persons during meetings and workshops. The duration of their engagements will vary depending on the activities. For the individual experts/consultants, they will be paid at a daily rate of $150/day. NGOs can also be also be commissioned to assist the community in implementing livelihood project to the communities.

5. **Seed Grant for Community Enterprise**. A budget will be set aside to the community for the development of their enterprise in the amount of $5,000. The grant will be a seed fund to develop a forest-based enterprise to the selected CF. This is to make a test case of what possible revenues that can be made out of the CF. The progress of development of the community enterprise will be closely monitored by the FA and project staff.

6. **Supplies and Materials**. The supplies and materials will cover both the field and office supplies and materials. These include also the supplies and materials used in data collection.

7. **DSA**. The field staff will be provided a daily substance allowance when they will go on field or hold meetings and workshops. The DSA will cover for their meals and cost of accommodation. Based on the New Sub-decree on DSA for government staff has just been issued by the PM on 22nd July 2014, the following DSA will be provided:
   - Senior staff including Director of Department level will get 49 USD per day
   - Middle class staff will get 42.5 USD per day
   - Lower class including commune council members will get around 24 USD per day.

   Per day here means overnight stay. Otherwise, a deduction of 30 USD, 25 USD and 20 USD should be made to the high level, middle level and lower level government staff respectively

8. **Office Operation Cost**. The office operation cost will include internet and telephones/communications, maintenance of project equipment, electricity and water etc. Some of these will be counterpart contribution of FA to the project.

9. **Purchase of Vehicle**. A vehicle and 2 units of motor bikes will be purchased by the project to increase the mobility of the project staff during the course of project implementation. This is also part of building the capacity of the office in sustaining the project after it ends. Most of the areas in Prek Thnot are in remote villages and project vehicle are indispensable in project implementation and monitoring.

To increase the efficiency of the use of the resource, an independent monitoring and audit will be put in place aside from the internal monitoring and performance audit that will be conducted by the project management. The financial control and disbursement will be handled by the Admin and Finance Officer of the project. The detailed breakdown of the costs is presented in Annexes 8 and 9.

8.0 Monitoring and Evaluation

The monitoring will be conducted based on the progress of the work plan. Moreover, the different outputs will be monitored using the following indicators:

Table 1. Indicators for Monitoring

Goals and Objectives	Indicators of Achievements
Objective 1. To build capacity and raise awareness on the concept of integrated watershed/landscape planning for central and local stakeholders through scientific assessments, analysis and participatory watershed/landscape planning processes.	❑ KPI 1.1 Critical priority areas of Prek Thnot watersheds providing important ecosystem services especially irrigation and drinking water for local communities and downstream agricultural land and cities identified; ❑ KPI 1.2 Land use plan of Prek Thnot Watershed/Landscape developed through scientific assessment, analysis participatory planning process
Objective 2. To improve the integrated management of Prek Thnot Watershed with participation of stake holders.	❑ KPI 2.1A. Landscape restoration plans, considering the needs to both people and nature, are developed for 1-2 priority areas with 19 CFs and CPAs; ❑ KPI 2.1B. Numbers of river basins proposed for protection and restoration towards better water security and ecosystem services; ❑ KPI 2.1C. Areas in the pilot sub-basins proposed for restoration, protection and sustainable management for the benefits of both nature and people; ❑ KPI 2.2 Two (2) Farmer Cooperators in the pilot areas/river basins piloting community-based forest management livelihood and agroforestry technology ❑ KPI 2.3 1 Forest-based enterprise supported. ❑ KPI 2.4 Impacts analyzed and communicated to key stakeholders and authorities;
Objective 3. To share the experiences and lesson learned from the project to stakeholders.	❑ KPI 3.1 Best practices analyzed and summarized, leading to a suite of knowledge and communication products; ❑ KPI 3.2A. Project success and experiences disseminated through the Partnership for Integrated Watershed management/Landscape planning; ❑ KPI 3.2B. Greater brand recognition and stakeholder appreciation obtained from both local and national audience

Monitoring will be based primarily on the submitted progress report in relation to the approved work plan. The report (monthly) will be submitted by the field staff to the Project Management and evaluation will check for any variance. Spot checking will be done in the field to verify the reported accomplishments. An internal Annual Review will be conducted by the Team thru a small group meeting cum reflection workshop to assess the progress of the project.

9.0 Dissemination and Sustainability

The information dissemination activity will be conducted during the course of implementation. The biophysical status of Prek Thnot will be dissemination to different stakeholders. However, a forum will also be conducted to present the lessons learned and results of the land allocation. The results will be presented before the NGOs, FA, Communes, Districts and Provincial Governors, and representative from MLMUPC for the purpose of enjoining them to realign the land use plans in support of the integrated watershed management. Since the land allocation modeling is technical in nature, a faculty representative from the College of Forestry of the Royal University of Agriculture (RUA) will also invited. The Commune Land Use Planning is an ongoing process that the communes are conducting. The Commune Land Use Plans will also be updated periodically. The lessons learned and the experience of the exercise can be incorporated in updating the CLUPs of the communes in Prek Thnot watershed.

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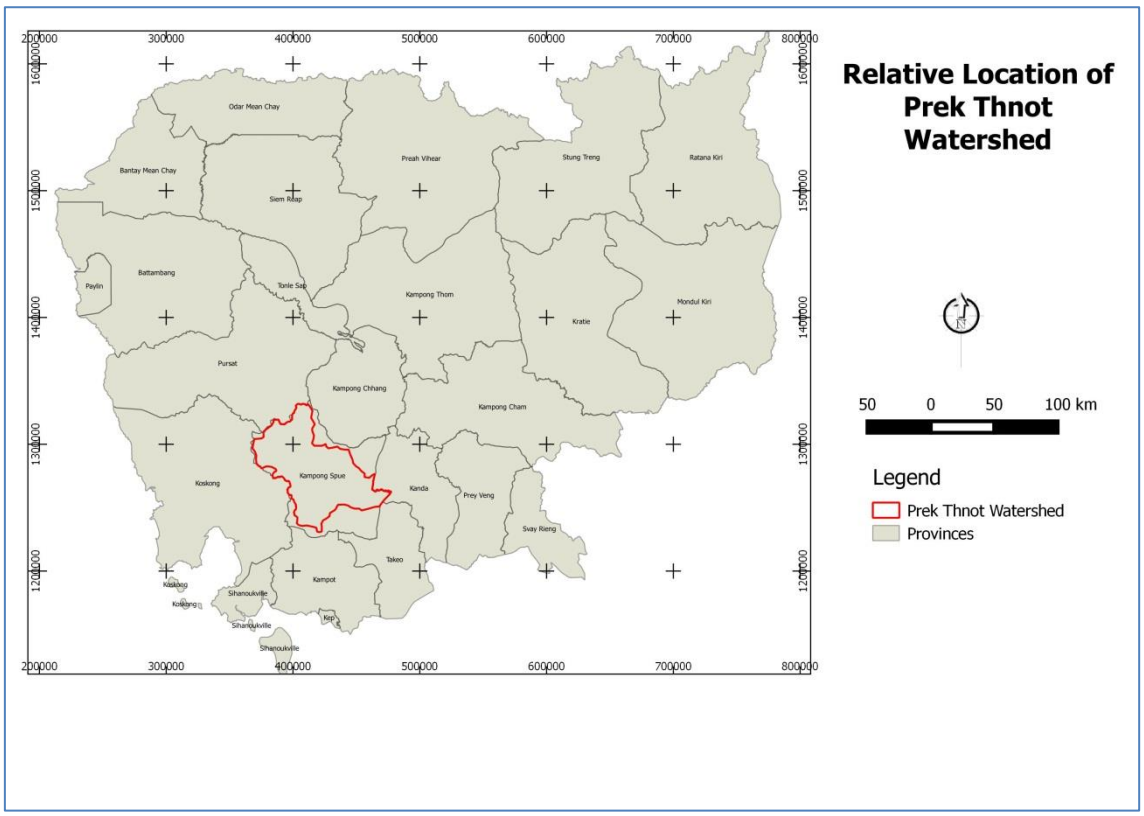
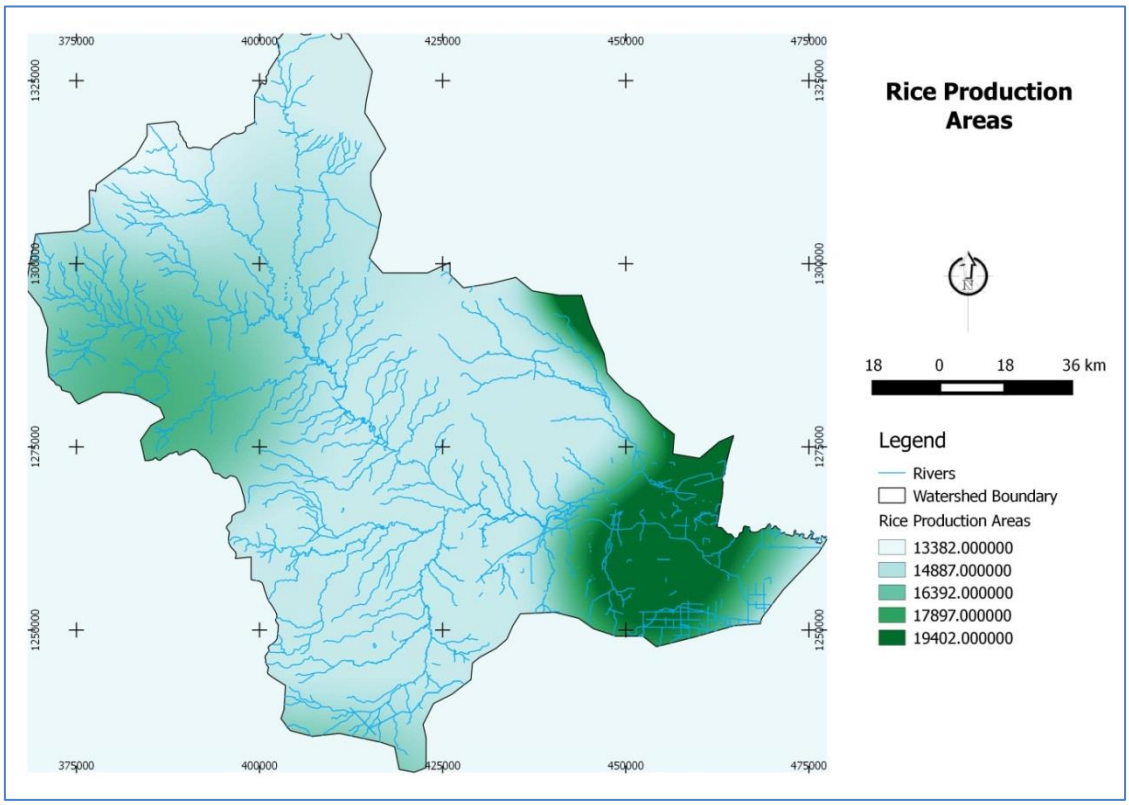
Annex 1. Relative Location of Prek Thnot Watersheds Relative Location of Prek Thnot Watershed Covering an Area of 601,876 Has.

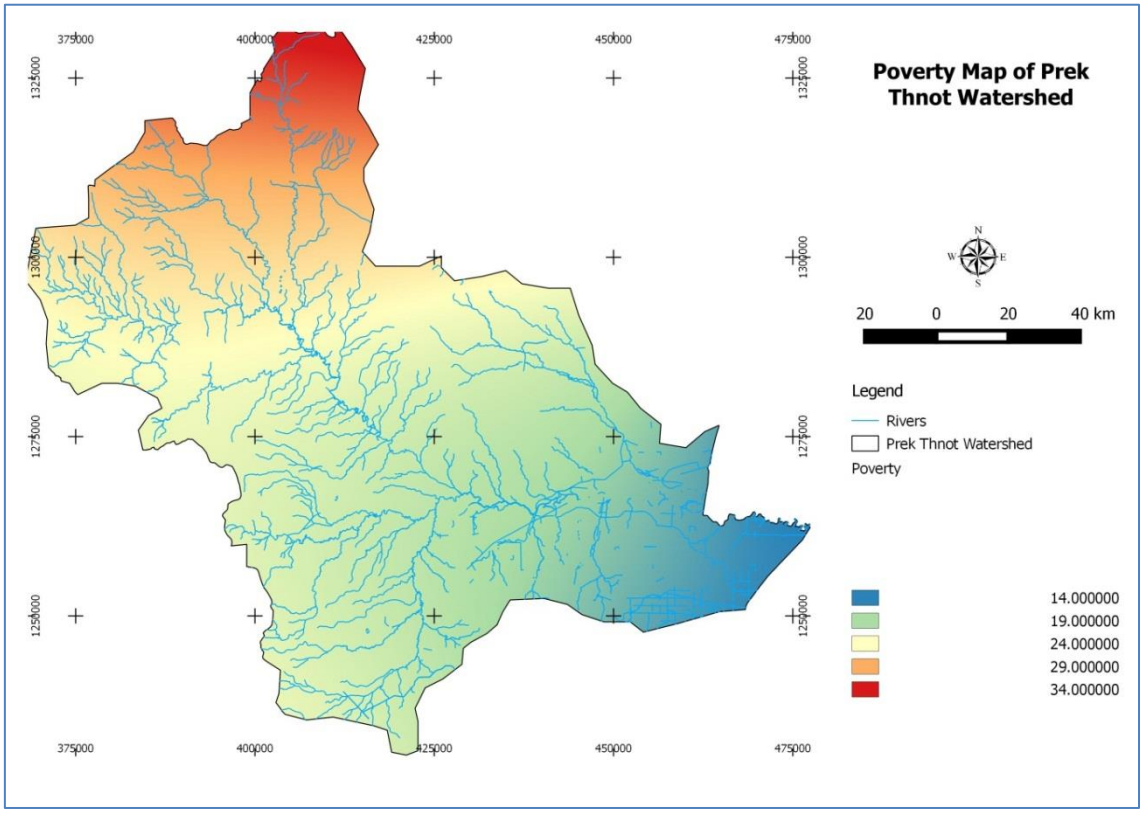


Annex 2. Forest Cover of Prek Thnot Watershed

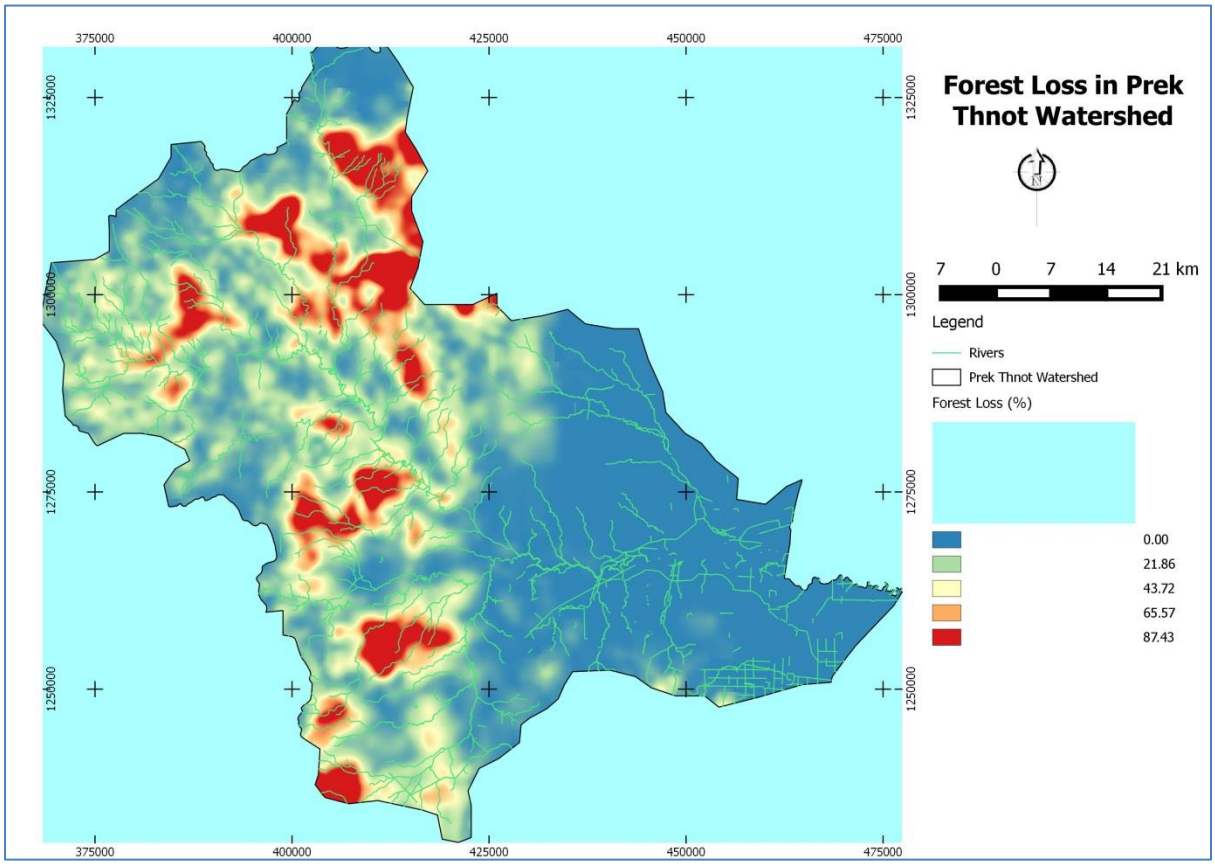
Annex 3. Rice Production Areas in Prek Thnot Watershed



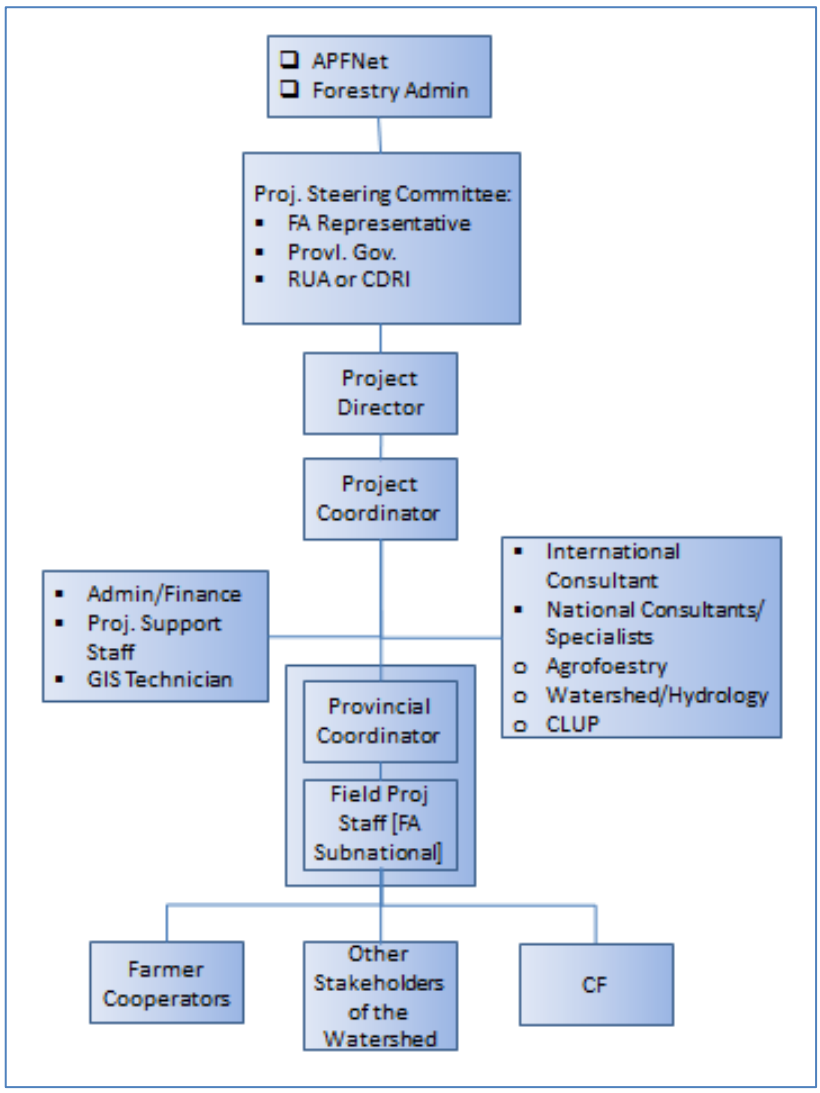
Annex 4. Poverty Map in Prek Thnot Watershed



Annex 5. Forest Loss and Location of Communities in Prek Thnot Watershed



Annex 6. Project Organizational Chart



Note: The different key roles and responsibilities of each position are described in Annex 11.

Annex 7. Project LogFrame

Intervention logic	Objectively Verifiable Indicators of Achievements	Means of Verification	Assumptions
Goal: To improve the ecosystem services (balanced watershed ecosystem services and social-economic development) of Prek Thnot Watershed Landscape thru judicious land use planning and wider participation of different stakeholders on integrated watershed management.	*Developed an integrated Watershed Land Use Development Plan of Prek Thnot Watershed in a participatory manner* *Different stakeholders at project site widely participated in watershed management activities*	Submitted Document Project terminal evaluation	(1) Support from the target Communes (2) There will be no major changes on the national government policy on Prek Thnot Watershed (3) All the development of the area are known; (4) The policy decision makers will recognize the importance of proper allocation of lands
Objective 1. To build capacity and raise awareness on the concept of integrated watershed/landscape planning for central and local stakeholders through scientific assessments, analysis and participatory watershed/landscape planning processes.	KPI 1.1 Critical priority areas of Prek Thnot watersheds providing important ecosystem services especially irrigation and drinking water for local communities and downstream agricultural land and cities identified;	Land allocation map	The GIS unit of IRD is fully functional; Base Maps are in place
	KPI 1.2 Land use plan of Prek Thnot Watershed/Landscape developed through scientific assessment, analysis participatory planning process	Land use plan for Prek Thnot watershed	All Spatial data had been compiled on time
Output 1.1 Improved knowledge and awareness of the target stakeholders on the concept of integrated Watershed Planning and the development issues in Prek Thnot Watershed that affect the forest-dependent communities	*At least 10 Project Staff are trained on participatory action research on agroforestry and basic hydrology monitoring and GIS* *Information on the issues and condition and the approach of integrated watershed planning in Prek Thnot Watershed was shared*	Proceedings of the Meetings Submitted Training Module prepared; TORS of Service Provide (Agroforestry); Training Report Submitted	The communes, district and provincial government will participate in the scheduled meetings The target participants will be available and willing to join the training
Output 1.2 Watershed characterization report of Prek Thnot Watershed	*A watershed profile of Prek Thnot is developed indicating the socioeconomic conditions and hydrological characteristics*	Hydrological data compiled	The FA staff trained will properly get the data

Intervention logic	Objectively Verifiable Indicators of Achievements	Means of Verification	Assumptions
Objective 2. To improve the integrated management of Prek Thnot Watershed with participation of stake holders.	KPI 2.1-A Landscape restoration plans, considering the needs to both people and nature, are developed for 1-2 priority areas with 19 CFs and CPAs;	Landscape restoration plan developed for Prek Thnot	There is a consensus among stakeholders on the land allocation plan of Prek Thnot
	KPI 2.1-B Numbers of river basins proposed for protection and restoration towards better water security and ecosystem services	Priority river basins for restoration proposed in the restoration plan	The criteria for land allocation agreed among the stakeholders
	KPI 2.1-C Areas in the pilot sub-basins proposed for restoration, protection and sustainable management for the benefits of both nature and people	Areas for restoration identified in the restoration plan	The criteria for land allocation agreed among the stakeholders
	KPI 2.2 Two (2) Farmer Cooperators in the pilot areas/river basins piloting community-based forest management livelihood and agroforestry technology, forest management and sustainable livelihood approaches	Reports submitted	There will be no change of the land use of the area identified for AF
	KPI 2.3 One (1) Forest-based enterprise supported	Developed Enterprise plan	The community will be ready to undertake the CF enterprise development
	KPI 2.4 Impacts analyzed and communicated to key stakeholders and authorities	Analysis of impacts embedded in the Watershed Plan	Economic valuation of the different land uses are available
Output 2.1 Integrated watershed landscape development plan for Prek Thnot Watershed developed	*An integrated watershed development plan for Prek Thnot was developed indicating the optimum allocation with consideration to its carrying capacity*	Integrated Watershed Development Plan Developed	All the information are in place
Output 2.2 Two demonstration sites on agroforestry system, contributing to soil and water conservation and livelihoods established	*2 Agroforestry Site established and monitored for hydrology and farm productivity*	Reports Submitted	The sites had been identified and properly monitored
Output 2.3 Forest-based community enterprise supported	*Enterprise Plan Developed* *Enterprise established and operated effectively*	Enterprise plan developed Project terminal evaluation	The CFs will activity participate in the planning and the FA subnational will effectively facilitate the planning

Intervention logic	Objectively Verifiable Indicators of Achievements	Means of Verification	Assumptions
Objective 3. To share the experiences and lesson learned from the project to stakeholders.	KPI 3.1 Best practices analyzed and summarized, leading to a suite of knowledge and communication products	Documented proceedings	There is proper documentation of the proceedings of the planning exercise
	KPI 3.2A. Project success and experiences disseminated through the Partnership for Integrated Watershed management/Landscape planning	Proceedings of the forums	The land use plan had been completed
	KPI 3.2B. Greater brand recognition and stakeholder appreciation obtained from both local and national audience	Proceedings of the meetings expressing commitment of support	The land use plan had been endorsed among the different stakeholders
Output 3.1 Project success and experiences disseminated and policy briefs for the sustainable development of the Prek Thnot Watershed drafted submitted to relevant authorities	Key results disseminated and supported by central and local stakeholders and authorities.	Policy brief; Watershed land use plan for Prek Thnot watershed submitted	There is a continuous documentation of the proceedings and lessons learned
Activity 1.1.1 Map out critical areas in Prek Thnot watershed that provide substantial irrigation water to agricultural land and identify priority areas for forest-dependent communities and habitat for wildlife.			
Activity 1.1.1.1 Assess the training needs and provide trainings	*Training needs identified; Training plan formulated* *Training courses conducted*	Training needs assessment report Training plan and related training documents prepared	
Activity 1.1.1.2 Collection of base maps and pertinent data of the watersheds (Land Use/vegetation Cover Maps from Secondary Data, Satellite Image Analysis and social economic data).	*Base maps on land use, forest cover, poverty, development, Commune Land Use Plans, ELCs, CFs, CPAs, etc. compiled for digitizing*	GIS Maps compiled	Concerned agencies readily share base maps
	Maps derived from spatial analysis	GIS Maps compiled	Concerned agencies readily share base maps
Activity 1.1.1.3 Preparation for consultative meeting activities.			

Intervention logic	Objectively Verifiable Indicators of Achievements	Means of Verification	Assumptions
Activity 1.1.1.4 Conduct consultative meetings on integrated watershed planning with participations of stakeholders to map out the critical priority areas.	*Meetings conducted to the selected 5 Communes to raise awareness and determine their development priorities in Prek Thnot Watershed*	Proceedings of the forums and meetings prepared	The invited participants will be available and will represent the real needs in their respective communes
Activity 1.1.2 Develop a land use plan for the Prek Thnot watershed and critical priority areas to engage the stakeholders in the mapping and assessment processes and wrap-up results to inform concerted support and leverage greater actions from the stakeholders.	*Integrated Watershed Development Plan developed identifying land use options*	Developed Integrated Watershed Development Plan	All the information are in place
Activity 1.1.2.1 Spatial Land Allocation Mapping	*Optimal land allocation of Prek Thnot Watershed developed*	Land allocation map	The information are properly modeled based on the credible data
Activity 1.1.2.2 Conduct provincial stakeholders forum to present the results of the consultations, the result of the preliminary land allocation and draw action plan for the development of Prek Thnot Watershed Landscape.	*Provincial forum attended by NGOs and Provincial Governor to formulate action plan for Prek Thnot watershed development*	Proceedings of the Meetings Submitted	The communes, district and provincial government will participate in the scheduled meetings
Activity 1.2.1 Preparation for watershed characterization activity			
Activity 1.2.2 Conduct bio-physical, socioeconomic survey and risk assessments to the critical priority areas (may include 30 villages in the target Communes in the districts of (1) Thpong; (2) Samraong Tong; (3) Phnum Sruoch; (4) Aoral).	*Socioeconomic data collected and analyzed*	Baseline survey report prepared	Data are properly collected
Activity 2.1.1 According to the mapping and assessment, develop participatory landscape restoration and sustainable management strategies and action plans for the identified critical priority areas.	*Action Plan developed*	Action Plan prepared and submitted	The target beneficiaries will actively participate in the deliberations and consultation

Intervention logic	Objectively Verifiable Indicators of Achievements	Means of Verification	Assumptions
Activity 2.2.1 Preparation activities for the AF Site developments	*Farm plan developed*	Sketch map of the farm indicating the land developments and crops to plant and the soil and water conservation measures to implement	The farmer will not change their commitment and use of their lands
Activity 2.2.2 Identification of two agroforestry sites/ farmer cooperators.	*Agreement formally signed by the FA and the Farmer Cooperator*	Maps of the pilot sites identified; Contract Signed with the Farmer Cooperator/Researchers	The identified farm will not be changed to other incompatible uses
	AF site supported on AF technology; hydrological, soil and socioeconomic data are collected	Documentation; Photos of the farmers developed	The target farmer cooperators will be interested to join
Activity 2.2.3 Establish regular soil and hydrological monitoring systems and measures, and based on regular monitoring and periodic assessment, analyze and communicate the results to stakeholders.	*Establishment of low cost/improvised rain gauge; and soil erosion plots; rainfall and soil erosion data collected*	Documentation of the rainfall and soil erosion Sites visits during project terminal evaluation	The farmers will continuously collect the rainfall data and will not migrate to other countries; there will be no change of the land use of the farmlot; the FA staff who will assist the farmers will not be reassigned; the farmers and the FA subnational staff will be provided with the DSA and reasonable remuneration in the collection of the data.
Activity 2.3.1 Preparatory activities for PRA and forest-based enterprise development	*Community commitment of support, arrangement on the benefit sharing, working committees and alternative plans for community enterprises*	Proceedings of the meeting as part of the process documentation	The preliminary identified enterprise (ant raising) identified by key leaders will be acceptable to the community members
Activity 2.3.2 Conduct PRA for Potential Enterprises	*Information on potential enterprises compiled and analyzed*	Listing of potential forest products	There are sufficient forest products found in the forest
Activity 2.3.3 Writeshop planning for the forest-based enterprise in a community forest	*Enterprise Plan Developed*	Enterprise plan developed	The CFs will activity participate in the planning and the FA subnational will effectively facilitate the planning

Intervention logic	Objectively Verifiable Indicators of Achievements	Means of Verification	Assumptions
Activity 2.3.4 Implementation and monitoring of the forest-based enterprise in a community forest	*Small scale forest-based livelihood/enterprise project implemented and monitored*	Case study results of 10 community enterprises	There will be sufficient products that can be developed from the forests
Activity 3.1.1 Develop knowledge and communications products including best practices, case studies and policy recommendations based on the experiences from the pilots, and circulate the products at various levels, through the delivery of a Communications and Advocacy Strategy.			
Activity 3.1.1.1 Compilation of the proceedings and lessons learned Learned/Writeshop on Experience and Lessons Learned of the Project	*A summary of lessons learned*	Lessons Learned Prepared	Lessons learned had been properly documented
Activity 3.1.1.2 Drafting of a policy brief on sustainable development of the Prek Thnot Watershed	*Policy brief Developed to support the CBFM in Prek Thnot and minimizing the impacts of developments*	Policy brief submitted	All the data are made available
Activity 3.1.2 Organize and launch national campaigns to raise awareness among the public, particularly residents in the capital city of the province and country on integrated watershed/landscape management and restoration, to leverage greater support to project initiatives and recommendations, and to enhance brand recognition of all participation organizations.	*Publications made on the lessons learned*	Commune Land Uses Analyzed	Digitized CLUPS are available

Annex 8. Stakeholder Analysis

Stakeholders	Current Activities and Involvement	Impact of the Project	Role
Community based Forest Organizations (CF/CFMC and CPA) - Community Forestry (CF) and Community Protected Areas (CPAs)	Currently, there are 26 CFs located within Prek Thnot. 19 of these are located in the target site (i.e. within K. Speu province). Three CFs are located within the ELCs and one is located inside the Protected Forest. The Government granted rights to the communities the right to manage the community forests thru CF (for areas under FA) and CPA (under MOE) modalities or tenurial arrangement.	The CFs and the CPAs are required to develop CF Management Plan (CFMPs) and CPA management plans (CPAMPs) so that they can proceed for the commercial utilization of the forest products on a sustainable manner. Although CPAMP is generally directed towards conservation, the CFs generally has more latitude of developing its CF, either for Timber Production, Agroforestry, Firewood Production or for Conservation (REDD+ and Ecotourism). The overall development of the watershed landscape will influence their decision on how the CFMP/CPAMP should proceed.	They will participate in consultative process of development for the watershed landscape. Five CFs will be selected as pilot site for Agroforestry trial/ Participatory Action Research. They will then act as farmer collaborator in the field testing of agroforestry technologies and in data gathering.
Non-Forest Dependent Farmers (Rice Farmers, Cassava Developers)	Some farmers also inhabit the lowland areas. They developed most of their lands for crops such as rice (irrigated or rain fed). At present, some of them have no clear land tenure. They may be interested to form a CF group, but without knowing which part of the landscape is suited, their application might not be granted.	They can potentially benefit by the development in the watershed. In case they will opt for CBFM, they can clearly see which part is suitable for CBFM. Also, they will be guided on what appropriate development is suitable in his area (wood fuel, agriculture, etc.)	This group can take part in the consultation process as well as in decision making.
Lowland/Urban Communities (Communes, Districts, Environmental NGOs, Fishermen)	The lowland communities are composed of the urban dwellers, the local authorities (Communes, District Governors) representing the people, and the Environmental NGOs. The Fishermen will also be part of the affected by the hydrologic function of the watershed. Downstream are the urban dwellers who are recipient of surface runoffs coming from the headwaters of Prek Thnot Watershed. During high monsoon, the urban dwellers will experience flooding. The flooding will further be aggravated by the deforestation in the	The effective management of the upland areas will minimize the incidence of flooding in the lowland communities. At the same time, the urban dwellers will benefit on the maximized production of the watershed for food. A sustainable development in the upland will protect the headwaters and the breeding grounds of fishes.	They will involve in the decision making and participatory planning. During consultation, they will participate in the decision making on the development of the upland areas. They can take part on decision making during the consultation process.

Stakeholders	Current Activities and Involvement	Impact of the Project	Role
	uplands. These sectors of the society depend on the watershed for water and projection. However, the increasing population also have the highest demand for food. Their participation to the management of the upland areas however is very limited. There are no exact estimate how many are dependent on fishing. However, it is known that fish is one of the major protein sources of the Cambodian people. Many are also dependent on fishing for livelihoods. They depend largely from the streams and rivers coming from the headwaters of Prek Thnot watershed. The first order streams are known to be spawning grounds that supply fingerlings to the main water tributaries. Any disturbances in the uplands will impact the fish productivity and ultimately, the lives of the fishing communities. However, they have no part in deciding what to do in the uplands.		
Economic Land Concessions and Private Investors	There are presently 21 ELCs in Prek Thnot Watershed. Nine of these ELCs are located in the Conservation areas and 2 covered the CF areas. There is only one mining concession within the Prek Thnot watershed. But this is located within the protected forest of FA. Many ELCs responded to government's call to invest in rural developments. They bring in funds to develop for cassava, rubber, cashew and other industrial crops. However. They are concerned of the conflicts that often arise on the course of development. Accusations are hurled that they destroyed the forests. Their investments can potentially bring economic progress if these will not seriously impair the environment.	The project will guide potential investors the appropriate areas for development of industrial crops. The proposed landscape plan will also provide inputs how ELCs can contributed to the sustainable development of the watershed.	The ELCs and the Mining Company may take part in the consultation and provide inputs on how to integrate sustainable development in their development plan and how to minimize the impacts to the environment.
Local Authority - Communes	There are 189 communes partly or entirely covered or located within Prek Thnot	The project will help the communes in aligning their plans to contribute to the	They can provide information on the land uses of their communes

Stakeholders	Current Activities and Involvement	Impact of the Project	Role
	watershed. 65 of these are located within the proposed coverage of the plan. The Communes are responsible for the development of the Commune Land Use Plans (CLUPs) where they integrate the sustainable development aspects of the land uses. Some of the communes have developed CLUPs while some have not. They also played a very important role in the current government's land titling program, looking for suitable sites for ELCs, and in the development of CBFMs. They integrate the village plans and submit to the District/province. They are primarily responsible for the economic development in their area thru the formulation of the Commune Investment Plan/Commune Development Plans. And these are based on the Commune lands Use maps that they develop. However, the communes are planning within their territories, and are not based on the broader framework, like the watershed landscape. Since their outlook is too parochial, there are tendencies that the land use planning effort will have limited contribution to the overall function of the watershed. Because of these, there is a great possibility that the sum total of development/land uses might exceed beyond the carrying capacity of the watershed. The commune councils can also participate in CF development under partnership Forestry modality.	broader goal of sustainable development of the watershed landscape. The integrated watershed use plan will also provide a means of orchestrating Commune developments that contributes to the sustainable development of the watershed.	and take part in the consultation process. They will also provide inputs on priority developments in their respective communities.
Local Authority-Provincial Government and District Government	The project will cover only Kampong Speu province and 4 Districts. The local authority (Province and Districts) provide direction on the economic developments in their areas. They promote an atmosphere that attracts investors. The District only oversees and approves the CLUPs prepared by the	The local Authority (Province and Districts) will primarily benefits by the project. The output of this project will serve as a decision making tool of the Local Authorities on how to proceed in the development of the watershed.	The local authority will provide general input on what are the criteria for development, and the priority developments in their respective areas.

Stakeholders	Current Activities and Involvement	Impact of the Project	Role
	communes. However, they have no broader plan that will guide the communes on spatial planning. The decision to endorse the application of the incoming investors (ELCs and Mining Companies) have not considered on its impacts to the watershed.		
Forestry Administration (Local and National)	The FA is responsible in facilitating the access to the forest resources to the community and providing security of tenure to the communities through Community Forestry. In the Prakas, the FA sub-nationals are responsible in finding potential areas for CFs. However, the granting of CFs are often sporadic or on ad hoc basis. There is no systematic planning where the CBFMs should be located or set-aside. As a result, there are some CFs that are located within the ELCs and in the Protected Forests. This situation has created frustrations to some extent because some of the applications will get stuck at the MAFF or simply being suspended. Although MAFF approves the application for CF applications, the FA will make the necessary recommendations for the approval of CFs. The endorsed potential CF areas are sometimes in conflict with the existing land uses (ELCs, Mining Claims or Conservation Areas). The Ministry has no other recourse but to suspend the application until the conflict is resolved which delays the CF formalization process. The FA is also working for REDD+, poverty reduction and food security and sustainable forest management. The proposed watershed management plan will guide the FA in the development of the watershed that will optimize the achievement of the goals. Currently, the Government is contemplating of pursuing a REDD+ at the sub-national level using a landscape approach.	The project will provide a tool to the FA on the sustainable management of the watershed. Furthermore, the project will help in building the capacity of the FA in watershed management. There will be effective implementation of REDD+ mechanism and potential watershed-based PES.	The FA will primarily be responsible in implementing the project. The Staff of the FA will facilitate the discussion, and collection of the data from the field, and facilitate the consultation with the different stakeholders.

Stakeholders	Current Activities and Involvement	Impact of the Project	Role
	This project could be a very powerful tool in analyzing candidate areas for REDD+.		
NGOs	They facilitated in the development of the CF Management Plans. They also campaign for the sustainable conservation and development of the watershed landscapes. Although the NGOs provide technical assistance to the communities (CFs), the areas where CBFMs are appropriate are not very clear.	The NGOs will be guided on their development works within the watershed. They will be aware of the holistic development of the watershed.	Will provide inputs in providing information on the development needs in the watershed.

Annex 9. Assumptions, Risks and Management of Risks

Assumptions	Risks	Probability and Potential Impacts of the Risks on the Project	Management of Risks
Updated data are available; Support from the other key players in providing information	The key stakeholders have biased development outlook and will exert influence on the other participants	There will be an inefficient prioritization	The consultation of the primary target beneficiaries (CFs) should be conducted separately
The head of office will allow their staff to participate the project; The staff will accept the allowable DSA	There will be movement with the other assignment/project	This might cause a delay by training other staff	Will make sure that there is back up staff

Assumptions	Risks	Probability and Potential Impacts of the Risks on the Project	Management of Risks
(1) Support from the target Communes (2) There will be no major changes on the national government policy on Prek Thnot Watershed (3) All the development of the area are known; (4) The policy decision makers will recognize the importance of proper allocation of lands	Some of the investments plans in Prek Thnot watershed are not known; Stiff opposition from the stakeholders when the allocation plan ran counter to their planned development	Make a wider stakeholder consultation as possible	Strengthen the consultation on how to mitigate the impacts of incompatible developments; Foster stronger consultation among the stakeholders
Participants are interested to attend and actively participate in the proceedings	The target stakeholders will be too rigid in their preferred uses of the lands	Difficulty in coming up with compromised agreements on how to proceed in the development	Constant consultation with the stakeholders
The communes, district and provincial government will participate in the scheduled meetings	Monopoly of views on how the watershed will be developed	The needed development reflective of what is needed in the field may be suppressed	There will be cross-checking of the information from the meetings thru post-consultation assessment
Concerned agencies readily share base maps	Spatial information are not readily shared by concerned agencies	Deficiency of the real information	Collect information from other sources such as NGOs literatures and ODC
The identified CF will actively participate in the discussion	The participants might not be very familiar on the needs in their respective CFs	There might be inefficient reflection of the needs in the land use plan	There will be cross validation in the site
The invited participants will be available and will represent the real needs in their respective communes	There might be pressures exerted by some sectors	The interest of the farmers will not be adequately represented	The information will be cross checked by the socioeconomic survey
The participants are available and willing to participate in the consultation meetings	The stakeholders are not knowledgeable on what to do with the watershed	There will be an unrealistic plan and the final output will have higher rate of discontent	Proper selection of the participants of the workshop

Assumptions	Risks	Probability and Potential Impacts of the Risks on the Project	Management of Risks
FA staff are available and are technical capable to do the job	Transfer of Staff; Staff might not be able to relay to the target stakeholders about the issues of the watershed	Delay in the planning process	There will be a backup from the project staff
Equipment are made available; Staff are available to do the work	There might be some movement and new assignment	There will be difficulty in the retrieval of information	The files will be backed up and field sharing
The trained FA Sub-national staff will deliver what they learned in the training	The FA Sub-national might forget what they learned	There will be inefficient data collection	Proper scheduling of the training and providing regular backstopping from the IRD
The target participants will be available and willing to join the training	Experiences on AF might still be not enough in Cambodian context	There will be limited adoption of the farmer cooperators on agroforestry	Draw from the experiences of other countries
There will be capable staff who will be trained on GIS	Interest may be low due to low incentives	There will be difficulty in the processing	The consultant should provide backstopping
The information are available from the concerned agencies	There might be difficulty in the collection of spatial data	The information might not be reflect of real time information	Source from other online spatial information
The FA staff trained will properly get the data	There might be improper collection of information	There will be an erroneous input to the land allocation model development	There will be a backstopping from the consultant on data gathering
The target beneficiaries will actively participate in the deliberations and consultation	The participants of the planning may have no sufficient background and idea on the priority of the sectors they represent	These will undermine the reliability of the plan	There should be a careful selection of the representatives
All the stakeholders had been consulted on the different uses of the watershed	During the consultations, the participants may withhold critical information on the watershed	The plan may not capture the real needs of the sectors	There must be a wider consultation as possible. Other information such as studies may be reviewed.
The FA subnational actively participate in the development of the	The FA subnational may provide less priority to the activity	The communities may restrict their access to the forest resource	The Project Staff will provide backstopping

Assumptions	Risks	Probability and Potential Impacts of the Risks on the Project	Management of Risks
Watershed plan			
The communes and Districts are willing to review the developed land allocation plan	Not all local authorities will be able to participate in the consultation process	Limited ownership of the plan and lack of commitments in its implementation	Involvement of the concerned agencies in the process and consultations
The different stakeholders will participate in the forum and consultative meeting	There will be limited participation of the target sectors	The action plans will be very biased to those stakeholders that will frequently attend the planning sessions	Should make follow up and site validation
All the original members of the team still works with the project	The original members of the team will be transferred to the other offices	-	Documents should be consolidated and properly stored
The FA subnational actively participate in the development of the watershed plan	The FA subnational may not have the full capability to conduct the planning; The GIS unit may not be functioning properly	There will be inefficient allocation of the area to different uses	The external consultant will provide the backstopping
The identified farm will not be changed to other incompatible uses	A contact will be made; The farmer cooperators will be given a modest compensation for his participation; Use the participatory approach to research; There might be some changes of the preferred Land use of the area	-	Contract of the farmer cooperators
There are available agroforestry sites and willing farmer cooperators	The target farmer cooperators may not continue to participate through the entire duration of the project; There might change of livelihood of farmer cooperators	-	the selection of the farmer cooperators should be strategically located and thoroughly assessed

Assumptions	Risks	Probability and Potential Impacts of the Risks on the Project	Management of Risks
The CFs will actively participate in the planning and the FA sub-national will effectively facilitate the planning	There might be limited resources that the community can commercialize. The handling of funds will also not be properly disbursed that will provide optimum results.	The proposed livelihoods may not be appropriate for the community	Should have constant and close monitoring
There will be sufficient products that can be developed from the forests	There might be insufficient capitalization for the development of potential enterprises. There is also a possibility that the local FA will not allow the community to engage in the commercial development of their products without developing first their CF management plans.	The identified livelihoods might not be able to produced good results. The community may not be encouraged to proceed in developing the community livelihood that they wish to develop.	Should focus on small and doable projects, such as charcoal production or silvopasture and NTFPs. The FA sub-national will be involved in the identification of the appropriate livelihoods that the community may be pursued.

Annex 10. Roles and Responsibility and Capacity of the IRD Teams

Position	Roles and Responsibilities	Capacity
Forestry Administration	Will exercise supervision to the Project Director, oversee the implementation of the Project and ensure that all the transactions and disbursement of funds are in accordance with the government rules and regulations.	
Project Steering Committee (PSC)	Will help the FA in keeping track on the progress of implementation of the Project and validating the reports, provide advice/recommendations on how to achieve the target in case of delay in implementation. The PSC will be headed by a DDG of FA, and its members consist of a representative of the Kampong Speu's Governor Office, research institution (such as RUA and CDRI), Department of Forest Management (FA) and the APFNet focal point. The PSC will meet twice a year, June and December. The meeting in December is to approve the annual work plan and budget plan of the following year while the meeting in June is mainly to keep tract of the project's progress.	
Project Director (Part Time)	Provides the overall direction of the project	The Project Director holds a higher supervisory position of the FA office. He is currently the head (Director) of the institute and has a very high educational background. He has extensive exposure on research and represents the county in many international fora.
National Project Coordinator	Responsible in the supervision and actual implementation of the work plans and budget of the project. Will ensure that the targets will be implemented according to schedule.	Dr. So Thea is a Deputy Director of the Institute. He has sufficient experience in the field of natural resource management, particularly on forestry and implemented several projects including the APFNet funded Project.
Provincial Coordinator:	Responsible in the supervision and actual implementation of the work plans and budget of the project. Will ensure that the targets will be implemented according to schedule.	Mr. Keth Nang holds a middle manager position with the IRD. He has sufficient experience in the field of natural resource management, particularly on forestry.
International Consultant	Provides technical guidance to the Project Coordinator in the implementation of the project,	To be recruited.

Position	Roles and Responsibilities	Capacity
	assistance in the technical report writing	
Watershed/ Hydrologist Consultant	Implements the field research on Watershed/Hydrology	To be recruited. The premier university in Cambodia has Watershed Experts that can be tapped as consultant of the project. He/she will lead in conducting the watershed/hydrological studies.
Agroforestry Consultant	Implements the field research on Agroforestry	To be recruited. The premier university in Cambodia has Agroforestry Specialist who can be tapped as consultant of the project. He/she will lead in conducting the agroforestry study.
Admin/Finance Officer	Controls the financial disbursements of the project as well as ensuring that the procurements will be in accordance to the government policy.	To be recruited. The Admin cum Finance Officer will come from the Staff of the FA on Secondment or Part time.
Project Support Staff	Provide support in the monitoring the field activities and in coordinating the field activities	To be recruited
Database Technician	Responsible in maintaining the information	To be recruited on par time. The FA staff at the national level will be recruited as part time staff of the project
GIS Technician	Responsible in compiling all spatial database	To be recruited on part time.
Provincial Team Leader	Supervises the Field Project Staff; Responsible in ensuring that the work plans will be implemented according to plan; Responsible in liaising with the province and other local leaders/stakeholders	The staff from the FA Cantonment will be recruited on a part time job.
Field Project Staff	Responsible in implementing the field activities; Provide guidance to the famer cooperators in implementing the Agroforestry Technologies; Coordinates with the Communes in the consultative and commune meetings	A Project Staff from the FA sub-national will be recruited as part time staff of the project. The recruitment of the FA sub-nationals is part of the capability building of the project.
Farmer Cooperators	Implement the agroforestry technologies and serve as partner of the project in conducting field researches	To be identified
Commune Focal Persons	Coordinates for the Commune and Consultative Planning	To be identified

Annex 11. Analysis of the Strengths and Weaknesses of IRD

	Strengths	Weaknesses
Strengths and Weaknesses	❒ The office is composed of highly educated forestry professionals who were trained outside the country ❒ The IRD staff have very strong background on Community Forestry ❒ The IRD staffs are very strong on scientific research and site restoration. ❒ Has the legal support mandated to conduct researches related to resource management, climate change and sustainable management of the forest. ❒ The staffs have good experience in the participatory Land Use Planning, a basic tool used in the PRA step in the establishment of community forestry.	❒ There is still limited experience on the use of various tools such as mathematical modelling ❒ The capacity of the field staff on participatory watershed planning is still limited ❒ The number of staffs in the IRD are limited and have no specialists on watershed/hydrology ❒ Limited logistical support ❒ The field staffs have limited training and capability to conduct research and to facilitate community development ❒ There are limited empirical data that would support the impact of soil and water conservation on soil hydrology
Strategies to make the project successful	❒ The IRD staff should focus on participatory research ❒ Involve the community on the planning	❒ Will hire International Consultant in the development of mathematical models ❒ Hire local consultants to do some of the highly specialized tasks ❒ Include in the procurement programs equipment such as vehicles, GPS and laptops to increase mobility, monitoring and collection of reliable data ❒ Conduct field experiments in the farmer fields

Annex 12. Data Needs

Data/Information Needed	Status	Uses	Where to Collect	Who will be Responsible	Method of Data Collection/ Generation	When to Collect/Generate
Map of Prek Thnot	Existing/Available					Done
Administrative Boundary (Province, District, Commune)	Existing/Available					Done
Conservation Areas/Parks	Partially Available			GIS Staff		
Lakes, Waterfalls and River Systems including hydrological characteristics	Partially available	Land Allocation		GIS Staff		
Topography (Contour Map of Prek Thnot Watershed)	To be collected/ digitized	Land Allocation	To be purchased	GIS Staff	This will be converted to JPEG thru scanning	At the beginning of the project
Slope Category Maps	To be generated	For land suitably analysis	Generated from slop maps	GIS Staff	Digitization by the Project Staff Spatial analysis	During watershed characterization
Digital Elevation Models (DEM) of Prek Thnot Watershed	Available/Existing	Facilitate in the analysis during Consultation		GIS Staff		
Socioeconomic Condition of the Area	Partially available	For land suitability modeling	Prek Thnot Watersheds	Koy Ra (partial) Research Team	Survey Literature Review	During Socioeconomic Survey
Population Maps	Partially available				Digitization	Digitization
Road Systems	Partially available				Digitization	Digitization
Soil and Geologic Maps	Partially available	Can be used to develop for crop suitability maps			Digitization	Project Implementation
Erosion Rates for each Land Uses	To be generated	Modeling	MAFF		Digitization	Project Implementation
Riparian/Buffer Zone	To be delineated	Modeling			Digitization	Project Implementation

Data/Information Needed	Status	Uses	Where to Collect	Who will be Responsible	Method of Data Collection/ Generation	When to Collect/Generate
Infiltration (Rate and Pattern/Map)	To be generated	Modeling	Experiment		Digitization	Project Implementation
Flooding Incidence/ Areas Vulnerable to Flooding	Partial	Modeling	MOWRAM		Digitization	Project Implementation
Rainfall Pattern (Isohyets)	Partially available					Project Implementation
Runoffs and Erosion from Different Land Uses	Partially available	Input to Carrying Capacity modeling	Literature Review Experiments	Local Expert	Experimental Plot (Agroforestry)	Implementation
Pollution Maps	To be collected	For land use allocation		Project Staff		Project Implementation
Vulnerable Areas	To be generated	For land allocation		Project Staff	GIS Modeling	Project Implementation
Forest Types	To be collected	For land allocation	FA	Project Staff	Digitization	Project Implementation
Forest Losses and Degraded sites	Partially available	For land allocation	FA	Project Staff	Digitization	Project Implementation
Agricultural Crops and agricultural production areas	To be collected	For land allocation	MAFF-DALRM	Project Staff	Digitization	Project Implementation
Crop Suitability Maps (which areas suited for cassava, cashew, rubber, corn, sugar cane, etc.)	To be Collected	For land allocation	MAFF-DALRM	Project Staff	Digitation	Project Implementation
Priority Industrial and Agricultural Crops	To be Collected	For land allocation	MAFF	Project Staff	Digitization	Project Implementation
Irrigated Areas	Partially available	For land allocation	MOWRAM Province	Project Staff	Digitation	Project Implementation
Satellite Image Cover (Google Image)	Available	For analysis				
Wood Deficit Areas (WISDOM Study)	Available	For land prioritization/ allocation				

Data/Information Needed	Status	Uses	Where to Collect	Who will be Responsible	Method of Data Collection/ Generation	When to Collect/Generate
Tenure Areas (Social Land Concessions, ELCs, Communal Land Titling, CFs, CPAs, Community Fishery, etc.)	Partially Available	Land Allocation	FA, Province, ELC Secretariat/MAFF	Project Staff	Secondary data Digitization	Project Implementation
Planned Investments/ Developments of the Province/ Commune (built up areas, infrastructures, etc.)	To be collected	Land Allocation	province	Project Staff	Secondary data	Project implementation
Communes with CLUPs	To be collected	For analysis	MLMUPC Province	Project Staff		Project Implementation
Land Allocation Map/CLUPs of the Selected Communes	To be collected	For analysis	MLMUPC Communes	Project Staff	Digitization	Project Implementation
Existing Projects (Reforestation, Researches, ecotourism projects, etc.)	To be collected	For land allocation	FA	Project Staff	Secondary data/digitization	During project implementation
Hydropower/Dams/ Reservoirs and Catchments	Partially available	For land allocation	MOWRAM	Project Staff	Secondary data	During project implementation
Economic Benefits/Valuation of the Different Land Uses	Partially available	Input to Land allocation	Research	Project Staff	Socioeconomic survey	During project implementation
Investment Plan of the Province (if there's any)	To be collected	Land Allocation	Province	Project Staff	Secondary data	Project Implementation (base map Collection)
Land Use Preferences (Ranking)	To be collected	For land allocation	Consultation	Stakeholders	Consultation	During Consultation
Criteria for Different land uses	To be collected	For Land Allocation	Stakeholders	Stakeholders	Consultation	During Consultation