



*Asia-Pacific Network for Sustainable Forest Management  
and Rehabilitation*

# **Integrated Forest Ecosystem Management Planning and Demonstration Project in Greater Mekong Sub-region (Cambodia)**

## **PROJECT PROPOSAL**

Institute of Forest and Wildlife Research and Development

Forestry Administration, Cambodia

**Date of submission:** April 18, 2017

<b>Project title</b>	Integrated Forest Ecosystem Management Planning and Demonstration Project in Greater Mekong Sub-region (Cambodia)		
<b>Supervision agency</b>	Forestry Administration (FA)		
<b>Executive agency</b>	Institute of Forest and Wildlife Research and Development (IRD)		
<b>Project period</b>	48 months from the date signing the project agreement		
<b>Total budget(US\$)</b>	<b>Expected APFNet grant(USD)</b>	<b>FA Counterpart (USD) (in cash and in-kind)</b>	<b>Community Counterpart (USD) (counterpart in labor)</b>
1,792,663.60	1,515,465.60	237,192.00	40,006.00

#### **Outline of the Project:**

The Cambodian sites of Integrated Forest Ecosystem Management Planning and Demonstration Project in Greater Mekong Sub-region are located in three provinces, i.e., Kampong Speu, Siem Reap, and Phnom Penh provinces. In Kampong Speu Province, the Damrey Chakthlork Community Forest (CF) in Dokpor village, Krangdeivay Commune, Phnum Srouch District, with a total area of 1,452 hectares, is selected to demonstrate the improvement of CF management through developing restoration technologies and demonstrating integrated management models. In Siem Reap and Phnom Penh provinces, two sets of forest watcher systems is to be installed and demonstrated in Khun Ream Forest Research Station and Ta khmao Zoo Forest respectively, through which a total of 4,368 hectares of state-owned forests is to be on-time monitored, so as to strengthen the conservation of state-owned forests. The total budget is US\$1,792,663.60, of which APFNet's grant is US\$1,515,465.60 and counterpart contributions from FA and Community are US\$237,192.00 and US\$40,006.00, respectively.

#### **Goal and Objectives:**

The goal of this project is to rehabilitate ecological services and product provision of forests in Cambodia through improvement of community forest management and strengthening state-owned forest conservation, so as to contribute to sustainable forest management in Greater Mekong Sub-region.

#### **Project Objectives:**

1. To develop a model for community forest management by strengthening CF management and testing appropriate restoration and silviculture technology;
2. To mitigate the dependence of community to forests by improving household farming systems;
3. To enhance forest protection through adopting advanced forest monitoring system (Forest Watcher); and
4. To extend achievements and related techniques in Cambodia and GMS by demonstration and experiences sharing.

#### **Project Outputs:**

Objective 1 To develop a model for community forest management by strengthening CF management and testing appropriate restoration and silviculture technology

Output 1 CF Management Plan formulated

Output 2 CF boundary demarcated and patrolled

Output 3 A FA Triage nursery improved  
Output 4 Restoration and silviculture models established

Objective 2 To mitigate the dependence of community to forests by improving household farming systems

Output 5 Village water supply system established  
Output 6 Agroforestry farming system established  
Output 7 Homegarden farming system established

Objective 3 To enhance forest protection through adopting advanced forest monitoring system (Forest Watcher)

Output 8 Forest watcher system and auxiliary facilities installed and maintained

Objective 4 To extend achievements and related techniques in Cambodia and GMS by demonstration and experiences sharing

Output 9 An integrated forest management technology assembled and a technical handbook formulated  
Output 10 Experience and technology demonstrated and disseminated

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Date:

## Abbreviations and Acronyms

<b>ANR</b>	Assisted Natural Regeneration
<b>APFNet</b>	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation
<b>CF</b>	Community Forestry
<b>ELC</b>	Economic Land concession
<b>FA</b>	Forestry Administration
<b>GMS</b>	Greater Mekong Sub-region
<b>IRD</b>	Institute of Forest and Wildlife Research and Development
<b>MTE</b>	Mid-Term Evaluation
<b>MRC</b>	Mekong River Commission
<b>NTFP</b>	Non-timber Forest Products
<b>NGO</b>	Non-Government Organization
<b>PSC</b>	Project Steering Committee



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## Project Details

### 1.0 Background

#### 1.1 Context and Situations of Target Region/Economy

The proposed project site for community forest management is situated in Damrey Chakthlork Community Forestry (CF). Damrey Chak Thlork is located in Phnom Srouch district, Kampong Speu province, a national permanent reserved forest and within Prek Thnot Watershed, one of the tributaries of the Lancang-Mekong basin (see Annex A-1-Basic Information). Poverty is happened mostly in the northernmost part of Prek Thnot watershed. The downstream part is in the southeastern part of the watershed where most of the residential areas are located. This downstream part is highly urbanized and the most are vulnerable to erosion and flooding. The risks to flooding increase as surface runoffs increase due to deforestation in the upland areas.

Another two sites for Forest Watcher System is in Khun Ream Forest Research Station (Siem Reap province) and Ta khmao Zoo Forest (Phnom Penh province) (see Annex A-1-Basic Information). There are three areas in Khun Ream Forest Research Station: 1888 ha of seed source area is a naturally regrowth forest area comprising of both deciduous and evergreen types of forests; 180 ha of newly planted area has mostly *Dalbergia Cochinchinences* specie with the ages from 2years to 4 years old; 15ha of seed orchard has planted with 3 major timber species of *Dalbergia C.*, *Pterocapus*, *Macrocapus* and *Depterocapus Intricatus*. Tamao Zoo Forest covers an area of 2285 ha, with all deciduous regrowth forest. It is the rescue and rehabilitation center for wildlife of Cambodia.

#### 1.2 Problems/Issues to be addressed

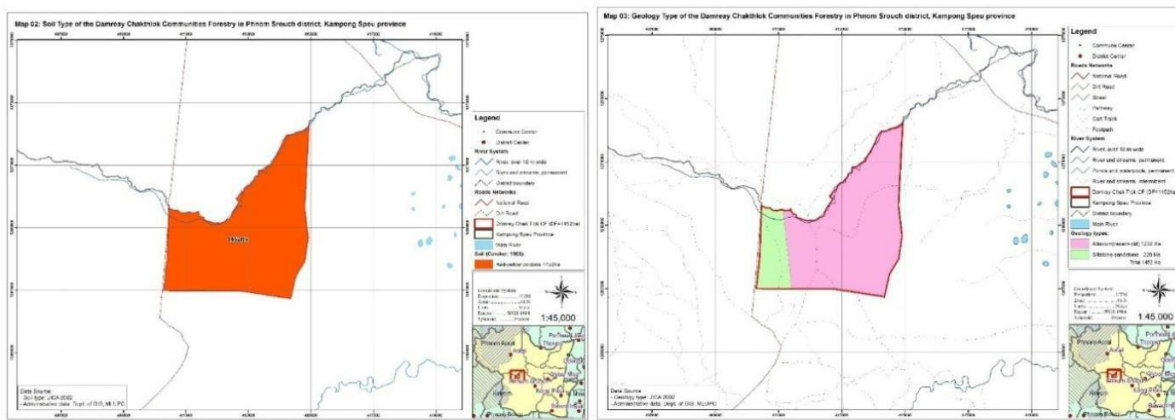
Prek Thnot is one of the watersheds that have the high risk of impairment of its watershed function (Hou *et al.*, 2004). Most of the forest cover in Prek Thnot watershed are found in the northwestern part although few patches of forests could still found on the downstream part. Prek Thnot is facing threats from: (1) Unabated illegal cutting of the forest areas, particularly those adjacent or within the Cardamom Mountains; (2) Fuel wood and charcoal industry. The forests in Prek Thnot watershed are major source of wood energy for Phnom Penh and nearby provincial towns; (3) Expansion of farms and agro-industries. The poor soil conditions of many small holder farms and Economic Land Concession (ELC) contribute to soil erosion; and (4) Settlers migrating from the nearby districts within Kampong Speu province and from other provinces. 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 risks to flooding increase as surface runoffs increase due to deforestation in the upland areas.

The State-owned Forests are facing problems of forest fires, illegal logging and hunting, land encroachment, grazing, and pests and diseases. The Forest Watcher System is expected to provide a continuous monitoring and surveillance of the surrounding of the pilot state-owned forests, and provide reference for decision-making on forest fire prevention, forest resources reservation and biodiversity conservation in the country.

#### 1.3 Justification of Selecting the Sites

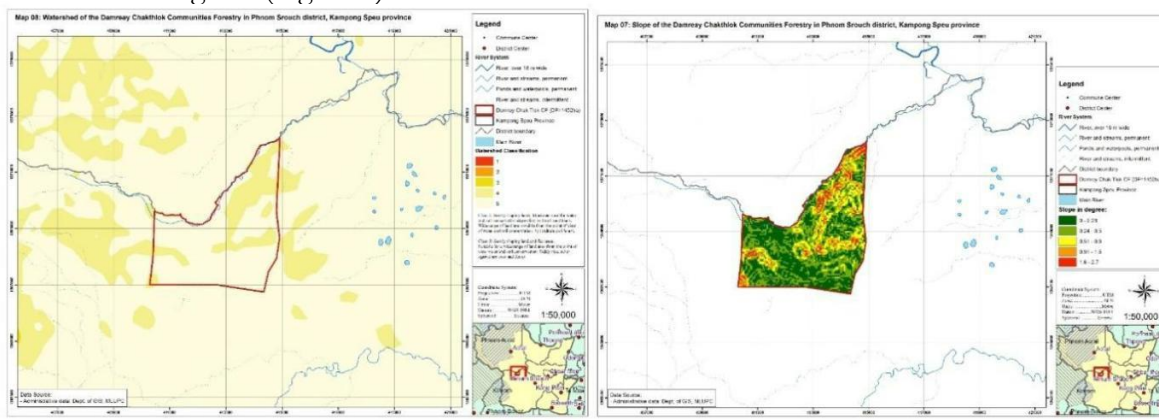
Damrey Chak Thlork CF that is located in Prek Thnot watershed provides an ideal site for demonstrating integrated ecosystem management considering that it is one of the tributary of Mekong watershed. The management of this catchment will have significant contribution on the overall integrity of the ecosystem.

The entire CF area receives uniform rainfall, approximately 1,500 mm per year (Figure 1).



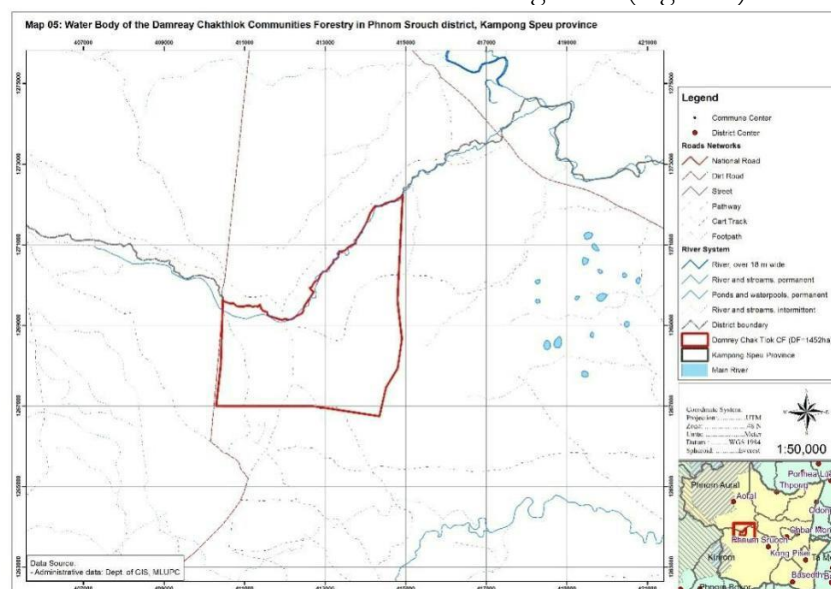
**Figure 1. Soil and geological characteristics of Damrey Chak Thlork CF**

Most of the area is gently sloping. This makes the area very accessible to visitors. The slope is mostly less than 0.5 degrees (Figure 2).



**Figure2. Topographic condition of the site**

At the northern part of the CF is a stream that is one of the tributaries connecting to the main rivers. It drains towards the main rivers and connects to the Mekong River (Figure 3).



**Figure 3. Water body found in Damrey Chak Thlork CF**

Both Khun Ream Forest Research Station and Ta khmao Zoo Forest are state-own forests. The former is responsible for Institute of Forest and Wildlife Research and Development, which is accessible well but with no electricity. A 35-meter high watch tower (longitude:104° 04' 59.95" ; latitude:13° 43' 54.40" ) will be constructed in Khun Ream Forest Research Station with a monitoring coverage radius

of 15km. The latter is under the management of the Tamao Wildlife Rescue Center of the Forestry Administration, has good access road and available electricity. A 30-meter high watch tower (longitude: 104° 47' 26.44, latitude: 11° 17' 59.20" ) will be constructed in Ta khmao Zoo Forest with a monitoring coverage radius of 15km. Problems the state-owned forests facing are typical in both sites such as forest fires, forest-related crimes, land encroachment and pests and diseases. Through the establishment of Forest Watcher System, monitoring and supervision, and related infrastructure will be provided to facilitate the conservation of state-owned forests in the two sites.

## **2.0 Significance and Necessity**

Conserving the forests upstream is very critical since the rivers and surface runoffs drains towards Phnom Penh. 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. 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. Most of its forests are severely degraded and needing rehabilitation. The loss of forest cover can greatly diminish the protective role of the watershed and increase the vulnerability of the downstream communities and increasingly subjects the downstream communities like Phnom Penh to flooding. It is expected that the community forest will also be able to increase its provisioning services to the community.

The demonstration project in the CF will complement the land use planning exercise that is currently being implemented by IRD and funded by APFNet. Implementing the project in the CF also contribute to the sustainability of the National Forestry Programme of the FA.

Furthermore, establishment of Forest Watcher System in state-owned forests in Khun Ream and Ta khmao will provide monitoring on forest fire, and supervision on forest resources and wild lives, which meets one of APFNet's priorities that is to reduce forest loss and degradation, and enhancing biodiversity conservation.

The demonstration sites will contribute to the overall framework of development of the Lancang - Mekong watershed management through the lessons learned from implementing the project. The project sites will showcase the approach of restorations in Cambodia and will serve as a model for visitors on ecosystem management.

## **3.0 Goal and Objectives**

### **3.1 Goal**

The goal of this project is to rehabilitate ecological services and product provision of forests in Cambodia through improvement of forest management and introduction of advanced forest monitoring system, so as to contribute to sustainable forest management in Greater Mekong Sub-region.

### **3.2 Objective**

To achieve the goal, the project aims to achieve the following objectives:

1. To develop a model for community forest management by strengthening CF management and testing appropriate restoration and silviculture technology;
2. To mitigate the dependence of community to forests by improving household farming systems;
3. To enhance forest protection through adopting advanced forest monitoring system (Forest Watcher); and
4. To extend achievements and related techniques in Cambodia and GMS by demonstration and experiences sharing.

## 4.0 Outputs and Activities

The outputs and corresponding activities are as following:

**Objective 1: To develop a model for community forest management by strengthening CF management and testing appropriate restoration and silviculture technology**

### Output 1 CF Management Plan formulated

Based on the latest available data and field investigation on the existing forest resources of the CF, an overall planning will be developed at different stages (short, middle and long-term) which covers forest ecological system, forestry industry system, cultural system, security system, institution building, personnel training and so on.

In accordance with the requirements of sustainable management, a 20-year forest management plan for the CF will be developed. Forest ecosystem management will be adopted in the plan, with balance between active protection and rational utilization of forest resources. The plan aims to enhance the integrated forest ecosystem service function in the region, and establish a model on how to develop and implement an integrated forest management plan in GMS.

- ☐ Activity 1.1 Survey current conditions of CF and its management
- ☐ Activity 1.2 Formulate and print CF Management Plan

### Output 2 CF boundary demarcated and patrolled

The project will support the CF in implementing some of its plan to establish poles and billboards in accordance to its CF Management plan. The project will also provide assistance to the CFMC in conducting patrol works. A modest budget for the field works will be provided to the Patrol Team organized by the CFMC.

- ☐ Activity 2.1 Make and install poles and billboard
- ☐ Activity 2.2 Patrol the CF

### Output 3 A FA Triage nursery improved

The project will produce planting materials that will be used in the restoration of CF, agroforestry and homegarden farming systems, as well as for other potential beneficiaries. The nursery facility of the FA triage will be improved. Seedlings such as *Cassia siamea*, *Pterocarpus macrocarpus*, *Dalbergia cochinchinensis*, *Dalbergia oliveri*, *Tectona grandis*, etc., will be distributed to the pilot project sites.

- ☐ Activity 3.1 Improve Triage nursery facilities
- ☐ Activity 3.2 Raise seedlings in the nursery

### Output 4 Restoration and silviculture models established

The target sites will be developed according to the result of the assessment and prescribed in the restoration and silviculture plan. The sites will be planted with appropriate species as recommended by the Experts. There are 3 restoration models and 1 silviculture treatment demonstration that will be tested in this project: (1) Restoring the deforested (open) areas; (2) Restoration of severely degraded forest; (3) Restoration of moderately degraded forest; and (4) Silvicultural treatment of dense forest. A trial of 16 hectares will be developed for the models and demonstration.

- ☐ Activity 4.1 Design and prepare soil for 3 types of degraded forestlands
- ☐ Activity 4.2 Plant and maintain restored forests
- ☐ Activity 4.3 Clear, plant and tend in dense forest

**Objective 2: To mitigate the dependence of community to forests by improving household farming systems**

## **Output 5 Village water supply system established**

A water system will be installed to facilitate farming and agroforestry of the villagers and improve the domestic water quality of local residents.

- ☐ Activity 5.1 Stabilize pond dike and install pumping facilities
- ☐ Activity 5.2 Lay out main water pipe from the pond to the village

## **Output 6 Agroforestry farming system established**

One way of addressing the degradation in CF through introduction of sustainable agroforestry. The Project will put up a demonstration for agroforestry models.

- ☐ Activity 6.1 Prepare soil, irrigation facilities and seedlings (including import)
- ☐ Activity 6.2 Plant and maintain cash trees and vegetable

## **Output 7 Homegarden farming system established**

Technologies such as multistory cropping/intercropping with cash trees, i.e. macadimia nut and *Ziziphus mauritiana Lamk*(Taiwan green jujube), will be introduced to improve land productivity and increase income of farmers.

- ☐ Activity 7.1 Prepare soil, irrigation facilities and seedlings
- ☐ Activity 7.2 Plant and maintain cash trees and peppers

## **Objective 3: To enhance forest protection through adopting advanced forest monitoring system (Forest Watcher)**

### **Output 8 Forest watcher system and auxiliary facilities installed and maintained**

The Forest Watcher Technology provides a continuous monitoring and surveillance of the surrounding. The data generated by the Forest Watcher will assist in reconstructing the trend of the forest cover and observation of wild lives based on the images generated from the forest watcher. The Forest Watchers will be installed in the research station in Khun Ream and in Tamao. The System adopts technologies such as Internet of Things, 3S, digital image processing and pattern recognition. Local staff will be trained to operate and maintain the system.

- ☐ Activity 8.1 Survey, design and construct auxiliary facilities
- ☐ Activity 8.2 Deliver and install forest watcher system
- ☐ Activity 8.3 Test system, train personnel, and process data/images
- ☐ Activity 8.4 Maintain and repair the watcher system

## **Objective 4: To extend achievements and related techniques in Cambodia and GMS by demonstration and experiences sharing**

### **Output 9 An integrated forest management technology assembled and a technical handbook formulated**

The project will compile and document the lessons learned and formulate technical handbooks, including technologies of CF restoration and silviculture and experiences of watcher construction.

- ☐ Activity 9.1 Summarize technologies of integrated CF management and experiences of watcher construction
- ☐ Activity 9.2 Formulate technical handbooks for integrated CF management and for the watcher operation

### **Output 10 Experience and technology demonstrated and disseminated**

Disseminate information to the stakeholders about techniques and lessons learned through field visits

and workshop. To further promote the knowledge, a policy initiative of CF management will be drafted and submitted to FA.

- ☐ Activity 10.1 Organize workshops and field visits of domestic foresters
- ☐ Activity 10.2 Publish a book of Community Forestry Development in Cambodia
- ☐ Activity 10.3 Draft and submit a policy recommendation of CF management to FA
- ☐ Activity 10.4 Participate in APFNet's project experience sharing activities

## **5.0 Budget, funding resources and financial management**

### **5.1 Budget and Source**

The estimated budget of the project totals in \$1,792,663.60 to defray the cost of implementing the project, purchase of equipment as well as the counterpart fund. About 84.5% (\$1,515,465.60) of the total will be funded by APFNet and the remaining 15.5% will be the counterpart fund of FA and the community. The budget includes the cost for the installation of Forest Watcher System. The detailed breakdown of cost by component is shown in Annex A-5.

This project will be funded mainly by APFNet with the FA providing in-kind counterparts. The in-kind contribution includes rental of facilities and the salary of key officials. The target group will also provide in kind contribution like the land where developments will be developed as well as some cost of their labor.

### **5.2 Assets Management**

#### ***5.2.1 Fixed Assets Management***

The procurement of fixed assets will be done following the established procurement procedures of the Royal Government of Cambodia. The files of fixed asset will be established and managed by the Accountant who will be designated by the project. The department in charge of the project should carry out an inventory of fixed assets at least once a year. All the equipments and other fixed assets, which are procured with APFNet's grant, shall be APFNet's property and shall bear APFNet logo and be kept sound during the implementation of the project, according to APFNet project management guideline. After all project activities are completed and validated by APFNet, APFNet might hand over these equipments and other fixed assets to EA of this project.

#### ***5.2.2 Current Assets Management***

Current assets include cash, bank deposits and low value consumables. After each activity finished, the handling personnel should fill in the account application form, after audited by the finance department and signed by project director.

#### ***5.2.3 Audit***

An independent auditing firm will be the administrative department will inspect the project financial situation. Executive agency should submit financial report annually to APFNet. An independent project audit will be carried out each year by qualified audit organizations.

## **6.0 Monitoring and evaluation**

According to APFNet Guidelines for Project Identification, Implementation and Management (PIIM,2013), the Project requires internal and external monitoring and evaluation.

## **6.1 Internal monitoring**

During the course of implementing the project, an annual-basis internal monitoring will be conducted by project management team to know the progresses and effects of implementation of activities of the project. The internal monitoring is essential because the monitoring reports and annual work plan are major materials to be submitted and approved during the PSC meetings. The monitoring includes the progress of implementation of activities and the effects of each activity. The former refers to the progress of purchase, construction, establishment, and installation of equipment and facilities and project sites. The latter includes monitoring of the growth of trees in plantations and the controls, operations of the forest watchers, and benefits generated from the project implementation, etc. Unexpected accidents and remedial measures should be reported to the APFNet before regular PSC meetings.

## **6.2 External Evaluation**

APFNet will recruit the international expert to conduct external evaluation every year, so as to guarantee the realization of outputs and objectives and the achievement of project goal. The evaluation covers detailed comparison between completion and workplan of all activities, effects of project implementation, outstanding achievements and existing problems. In addition, the ecological, social, economic influences of the project implementation are important during the evaluation.

International experts are required to carry out evaluation and submit evaluation reports on time. Domestic consultants can also be recruited to work with international experts if necessary, and Project management team and project staffs are required to assist the evaluation. External evaluation has to be based on monitoring reports, oral reports of project management team, and field surveys, etc.

## **7.0 Dissemination and Sustainability**

### **7.1 Dissemination**

The outputs and results in the process of project implementation will be publicized through leaflets, posters, videos, internet and publications.

- (1) Media: through local newspapers and magazines. The objectives, content, funding agencies of the project, achievements, experience and practice of the project will be publicized.
- (2) Project publicity signboard: the publicity signboard of demonstration project will be set up at significant position of the project demonstration sites. The contents of the signboard include the basic situation of project, measures and specific practices, implementation institutions and time, and funding agencies in particular APFNet.
- (3) Internet: the implementation progress and progressive achievement will be shown at the websites of IRD, APFNet and other possible platforms to have a wider dissemination about the lessons learned, achievements realized, and experiences accumulated of the project.
- (4) Handbook: technical handbooks for integrated CF management and for the watcher operation will provide the reference for the similar areas.

### **7.2 Project sustainability**

- (1) Social and economic sustainability

The technology that will be tested is expected to contribute to the improvement of the farm production of the farmer cooperators. It is expected that the project will motivate the other farmers who will be observing the farming method and adopt the technology promoted by the project. By adopting the agroforestry system, the farmers will be more resilient to the harsh climatic condition.

- (2) Environmental resource sustainability



The project is expected to contribute to the enhancement of the forest condition of the site and the productivity of the farms. Whenever appropriate, the project will introduce to the farmer a multistory cropping that will maximize the canopy layers and increase the biomass per unit area. The agroforestry technology also expects to contribute to the higher organic matter to the soil.

### (3) Administration system and strategy sustainability

The project organization and management system consists of the state FA, the IRD, and local FAs. The IRD will have in its team technical staff who will conduct the monitoring and overall supervision of the project. At the local FA level, selected FA Staff from the Cantonment, Division and Triage will be involved to implement the project together with the Community Forestry. The CFMC will be the one who will implement the project in their CF areas and will help in coordinating with the farmers in implementing the agroforestry technology. The CF areas are state land where one agroforestry site will be implanted. The other sites (1 home garden, 1 agroforestry site, and 1 water pond) will be established outside the CF area. In all cases, an agreement will be entered with the farmer cooperators. The project is aligned with the government's poverty alleviation program as well as the existing Forestry Law, particularly the Guideline of Community Forestry.

At the end of the project, the community will continue the activities through their collective efforts. Some of the activities like patrolling and meetings may be sustained partly by the intermediate income that will be generated from the community forest.

## **8.0 Guarantee System**

### **8.1 Human resource**

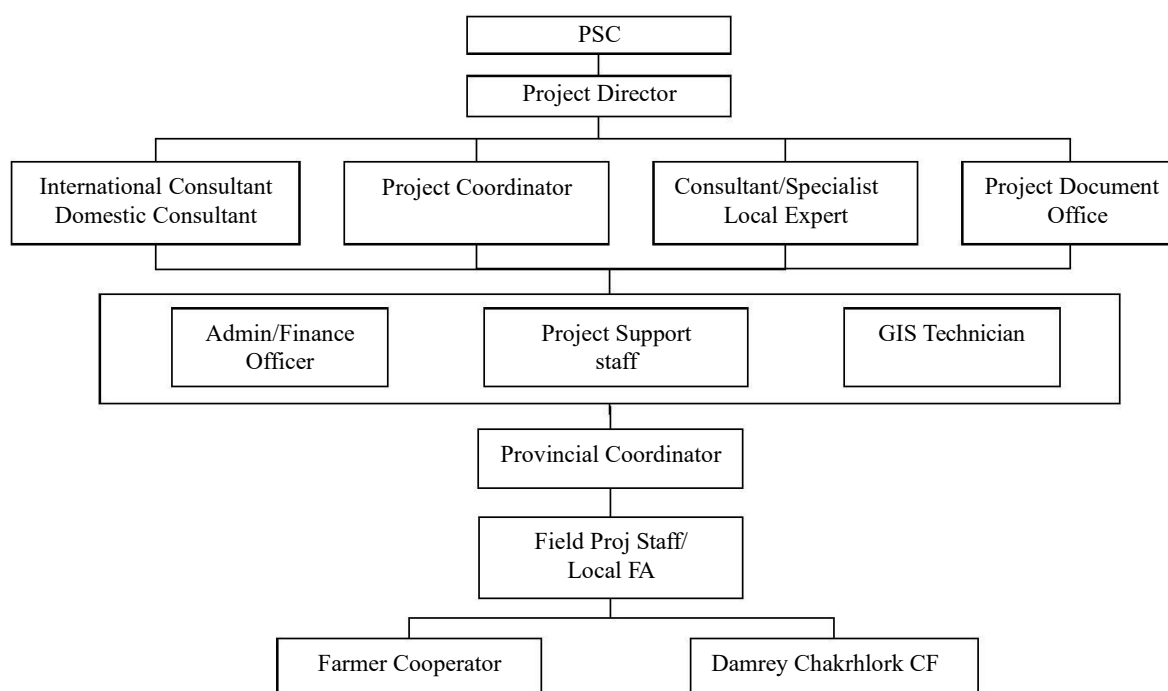
The project management team will be prepared for the official start of implementing the project. Preparatory activities such as formulation of the Annual Work Plan, recruitment of the Project Staff, and briefing of the recruited project staff will be done.

The project will be headed by the Director of IRD. Under him/her will be a Project Coordinator and several key personnel of the FA. The Staff to be recruited will be those who are proven to be competent in the field of restoration and facilitation. International Consultants and Domestic Consultants will be hired to provide backstopping on specific task.

Project Document Office under the direct supervision of Project Director is responsible for developing project progress report, project publicity materials in close collaboration with APFNet.

The Technical Staff still need to be strengthened in terms of the monitoring and planning, providing training, GIS, budgeting and operation of the Forest Watcher Technology. The Consultants will provide technical backstopping on these aspects.

The Project organizational chart is illustrated as follows:



**The project organizational chart**

- **Project Steering Committee (PSC).** The PSC will be composed of the Director General of the FA or his representative, the APFNet representative, and selected representative from the Academe, NGOs or local FA. The PSC will provide general guidance on the effective implementation of the project. The PSC will review and validate the work plan and the progress of accomplishing the targets. They will also review the AWP and endorse the AWP and progress report to the APFNet secretariat.
- **Project Director (Part Time).** The Project Director will be responsible on the general supervision of the project and deciding on matters that will be referred to him by the Project Coordinator. He will serve as a liaison of the project and to the APFNet secretariat.
- **Project Coordinator (Part Time).** Will be responsible in the day-to-day operation of the project and reports directly to the Project Director on matters involving technical matters, prepares the budget plan for the project.
- **Provincial Coordinator (full time).** Will be responsible in the supervision of the actual field work; coordinate the local FA and the communities involved in the project. The Provincial Coordinator will work full time of the project.
- **Admin/Financial Officer.** Oversee the administrative matters, record all expenses in accordance with the budget, prepares the financial report.
- **GIS Staff.** Responsible in preparing the GIS data files and other databases
- **Central Project Staff.** Assist the Project coordinator in preparing the activity plan, monitoring of the field accomplishments.
- **Field Project Staff/Local FA Staff.** Implements the different activities in accordance with the work plan and upon the directive of the Provincial coordinators.

## 8.2 Material Resources

The project will provide its existing facilities like the building and some equipment such as laptop computers, a communication systems, cabinets and fixtures. On the initial operation, the project will provide its facilities, computers for the preparatory woks. The project will further augment the existing equipment and facilities of the IRD to increase its capabilities when the operation became fully operational.

### 8.3 Policy and Regulation

State forests are managed by the Forestry Administration and Ministry of Environment in accordance to the Forest and Environment laws, which classify all Community Forestry areas as state forests. The community however, may manage the community forest on a sustainable manner. This can be achieved through the CF Management Plan. The implementation of the project will have a bearing on the national policies and regional programs. Government policies include the Forestry Law, Environmental Laws and Fishery laws and law on water resources. The National Forest Program of the Government also encourages to establishing at least 1,000 community forestry covering about 2,000,000 hectares. The CF must manage the forest in sustainable way in order to protect the forest from the degraded environment.

In the last decades, the Royal Government of Cambodia, through the Forestry Administration has shifted its strategy of empowering the community to manage the forest resources. The legal framework of Cambodia awarded full right to protect, to conserve and to develop of resources which they depend on. The community actively collaborates to the government in reporting illegal activities that they observed. While there are strong indicators on the success of Community Forestry in restoring the forest in the watershed areas, there is still very limited documentation on the success of CF in restoring the watershed landscape. The limited success of CF is also constrained by the limitations of funding.

The proposed project supports the development program of the Mekong River Commission. In 2010, the IWRM-based Basin Development Strategy for the Lower Mekong river basin was prepared. The strategy is a statement of the Lower Mekong river basin countries (Cambodia, Lao People's Democratic Republic, Thailand and Viet Nam) setting out how they will share, use, manage and conserve the water and related resources of the Mekong to achieve the goals of the 1995 Mekong Agreement (FAO, 2015). The member nations have agreed to prior consultation on proposed river water usage.

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.

### 8.4 Organizational Capacity

The executing agency IRD is a government agency under the Forestry Administration of the Royal Government of Cambodia that is vested to undertake researches and trials related to forestry. The IRD has extensive experience in terms of implementing restoration projects, REDD and community developments. The Institute also has an ongoing work on watershed and landscape restoration with the APFNet. The staffs of IRD have experience engaging the NGOs, the CFs in preparing the management plan, CF poles demarcation, nursery establishment and tree planting activities, extension of Forestry Law Capacity Building of CFMC. This project is upscaling of the previous APFNet projects which focus on planning. This project is currently linked to the regional program. Because of the regional scope and linkage to the other ecosystem (riparian and aquatic ecosystem), there is a need to further build the capacity of the FA staff. There is also a need to further strengthen the facilitation capacity of the local FA.

### 9.0 Risk Assessment

Several risks have been identified that may have constrained the achievement of the results. These include among others the movement of some personnel, the risk in the area and the unexpected delay of some projects. The different risks are identified in the Table below.

**Table 1. Identified risks and mitigating measures**

Risks	Mitigating measures
1 Coordination problems between participant agencies which influence the implementation of project activity	1.1 Clarify the responsibility, right, interest of each agency; 1.2 Strengthen the communication between project agencies; 1.3 Coordinate through project leading team.
2 Integrated management measures of forest ecological system may not coincide with the existing forest management practices, so that the project activities may be limited	2.1 Coordinate to get approval through PSC and local FA; 2.2 Separately implement activities which greatly impact forest, to reduce its impact area and intensity.
3 During the 5 years of the project implementation, the factors of rising price may result in the budget shortfall	3.1 Save costs as far as possible in the process of project implementation process, do not waste; 3.2 In the initial stage of the project, each outsourcing task will be fixed in the way of the contract to reduce the effect of the price rise; 3.3 Implement the project and purchase the equipment as <u>early as possible</u> .
4 Project execution agency lacks of technical strength which impacts the project results	4.1 Strengthen the training for project technicians on key techniques before the beginning of each project activity; 4.2 Strengthen technical support agencies' participation; ensure application of scientific and technological measures.
5 Poor forest management affects the effectiveness of demonstration forest	5.1 Organize a patrol and monitoring system to improve management; 5.2 Enhance education and publicity on forest protection awareness; 5.3 Organize trainings on operation and maintenance of Forest Watcher System.

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## **Annexes**

Annex A- Tables

Annex B - Maps

Annex C - Proof Documents

Annex E - Project Implementation Plan

### Basic information

Annex A-1

Activities	Name of the Site	Tenure	Accessibilit y	Area of land used for all kinds of forestry activities (Has.)	Forest Area  (Ha)	Growing Stock (m³)	Forest Cover Rate (%)	Population (No. of People)	Problems to be Addressed	Major Indigenous Tree Species
<ul style="list-style-type: none"> <li>Activity 1.1 Survey current conditions of CF and its management</li> <li>Activity 1.2 Formulate and print CF management Plan</li> <li>Activity 2.1 Make and install poles and billboard</li> <li>Activity 2.2 Patrol the CF</li> </ul>	Damrey Chak Thlok Community Forest, Phnum Sruoch District, Kampong Speu province		Accessible by road	Tot. CF Area = 1,452	1,452		49-55	715	The forest is confirmed to be a resource of the community but not well managed	<i>Dipterocarpus obtusifolius</i> <i>Phyllanthusemblica</i> <i>Buchananiasiamensis</i> <i>Sindorasiamensis</i> <i>Aporusafilicifolia</i> <i>Xylixylcarpa</i> <i>Canarium album</i> <i>Catunaregamtomentosa</i>
<ul style="list-style-type: none"> <li>Activity 3.1 Improve Triage nursery facilities</li> <li>Activity 3.2 Raise seedlings in the nursery</li> </ul>	Krang Devay Commune, Phnum Sruoch District								FA Triage nursery is incapable for raising enough seedlings	<i>Alstoniascholaris</i> <i>Bombax anceps</i> <i>Morindatomentosa</i> <i>Dipterocarpusintricatus</i>
<ul style="list-style-type: none"> <li>Activity 4.1 Design and prepare soil for 3 types of degraded forestlands</li> <li>Activity 4.2 Plant and maintain restored forest.</li> <li>Activity 4.3 Clear, plant and tend in dense forest</li> </ul>	Damrey Chak Thlok Community Forest			Area for Pilot Project totals in 16 ha, of which 12 ha for reforestation, and 4 ha for silviculture					CF is degraded in various extent, of which 400 ha are degraded forest area and 100 are deforested or open area	<i>Azadirachtaindica</i> <i>Oroxylumindicum</i> <i>Hopearecopei</i> <i>Zizyphuscambodiana</i> <i>Antidesmaghaesembilla</i> <i>Careyaarborea</i> <i>Cratoxylumformosum</i>
<ul style="list-style-type: none"> <li>Activity 5.1 Stabilize pond dike and install pumping facilities</li> <li>Activity 5.2 Lay out main water pipe from the pond to the village</li> </ul>	Dokpor Village		Accessible by road	2500m²	none	none	none	715	Water supply is a limiting factor of carrying out agroforestry and homegarden farming in	<i>Memecylonedule</i> <i>Millingtoniahortensis</i> <i>Terminalia alata</i> Misc.
<ul style="list-style-type: none"> <li>Activity 6.1 Prepare soil, irrigation facilities and seedlings (including import)</li> <li>Activity 6.2 Plant and maintain cash trees and vegetables</li> </ul>	Sunwang's land	farmer	Beside the water pond	0.7	none	none	none	5	Farmers don't know how to establish and manage agroforestry	<i>Croton joufra</i> <i>Dipterocarpusalatus</i> <i>Barringtoniaasiatica</i> <i>Cappariszeylanica</i> <i>Cassia gerettiana</i> <i>Diospyros ehretioides</i>
<ul style="list-style-type: none"> <li>Activity 7.1 Prepare soil, irrigation facilities and seedlings</li> </ul>	Nem's home yard	farmer	Beside the asphalt	1.2	0.7	none	45	5	No income from wide home yard and a waste of	<i>Haldiniacordifolia</i> <i>Irvingiamalayana</i>

Activities	Name of the Site	Tenure	Accessibilit y	Area of land used for all kinds of forestry activities (Has.)	Forest Area  (Ha)	Growing Stock (m³)	Forest Cover Rate (%)	Population (No. of People)	Problems to be Addressed	Major Indigenous Tree Species
<ul style="list-style-type: none"> <li>Activity 7.2 Plant and maintain cash trees and peppers</li> </ul>			road						lands	<i>Parinariannamensis</i> <i>Shoreaobtusa</i> <i>Spatholobusparviflorus</i> <i>Terminalia catappa</i> <i>Terminalia chebula</i> <i>Terminalia corticosa</i> <i>Wrightiaarbrea</i>
<ul style="list-style-type: none"> <li>Activity 8.1 Survey, design and construct auxiliary facilities</li> <li>Activity 8.2 Deliver and install forest watcher system</li> <li>Activity 8.3 Test system, train personnel, and process data/images</li> </ul>	Forest watcher #1 - Khun Ream Forest Research Station	State-owned forest	<ul style="list-style-type: none"> <li>Illegal hunting</li> <li>Good access road</li> <li>No electricity</li> </ul>	1888 ha of seed source areas 180h of newly planted area					<ul style="list-style-type: none"> <li>Forest fires</li> <li>Illegal tree cutting</li> <li>Illegal hunting</li> <li>Forest fires</li> <li>Land encroachment</li> <li>Grazing</li> </ul>	Naturally regrowth forest area comprising of both deciduous and evergreen types of forests Mostly <i>Dalbergia Cochinchinences</i> specie with the ages from 2 to 4 years old
				15ha of seed orchard					<ul style="list-style-type: none"> <li>Forest fires</li> <li>Grazing</li> <li>Pest</li> <li>Saplings health</li> </ul>	Planted with 3 major timber species of <i>Dalbergia C.</i> , <i>Pterocapus Macrocapus</i> and <i>Depterocapus Intricatus</i>
	Forest watcher #2 - Ta Khmao Zoo forest	State-owned forest	<ul style="list-style-type: none"> <li>Good access road</li> <li>Available electricity</li> </ul>	2285ha					<ul style="list-style-type: none"> <li>Land encroachment</li> <li>Wildlife poaching</li> <li>Forest fires</li> <li>Illegal tree cutting</li> <li>Wildlife movements</li> </ul>	<ul style="list-style-type: none"> <li>All deciduous regrowth forest</li> <li>It is the rescue and rehabilitation center for wildlife of Cambodia</li> </ul>
	<ul style="list-style-type: none"> <li>Activity 9.1 Summarize technologies of CF restoration and silviculture and experiences of watcher construction</li> <li>Activity 9.2 Formulate technical handbooks for integrated CF management and for the watcher operation</li> </ul>	Damrey Chak Thlok Community Forest; Dokpor village; Khun Ream; Tamao		All project areas					Lack of integrated CF management technologies and no experience to run the forest watchers	
<ul style="list-style-type: none"> <li>Activity 10.1 Organize workshops and field visits of domestic foresters</li> </ul>	Phnom Penh & pilot sites; Other		High accessible						There are successful experiences and models	

Activities	Name of the Site	Tenure	Accessibility	Area of land used for all kinds of forestry activities (Has.)	Forest Area (Ha)	Growing Stock (m³)	Forest Cover Rate (%)	Population (No. of People)	Problems to be Addressed	Major Indigenous Tree Species
<ul style="list-style-type: none"> <li>Activity 10.2 Publish a book of Community Forestry Development in Cambodia</li> <li>Activity 10.3 Draft and submit a policy recommendation of CF management to FA</li> <li>Activity 10.4 Participate in APFNet's project experience sharing activities</li> </ul>	Other economies								to be disseminated broadly in Cambodia & GMS	

**Current conditions of the research stations in Khun Ream and in Tamao, such personnel, infrastructure, and responsibilities.**

No. of Forest Watcher	Place	Personnel	Infrastructure	Responsibilities	Remarks
Forest Watcher #1	in Khun Ream Forest Research Station	5 permanent staff and workers plus at the station 20 security guards for protection of seed source area	* Good access road * No electricity	Under the Institute of Forest and Wildlife Research and Development	
Forest Watcher #2	in Tamao Zoo Forest	12 permanent staff 51 seasonal staff and security guards	Good access road Available electricity	Under the management of the Tamao Wildlife Rescue Center of the Forestry Administration	



## Logical Framework

### Annex A-4

Outputs / Key Activities	Objectively verifiable indicators of achievement	Sources of information and means of verification	Assumptions
Goal: Rehabilitate ecological services and product provision of forests through improvement of community forest management and introduction of advanced forest monitoring system, so as to enhance sustainable forest management in Cambodia and Greater Mekong Sub-region.	1) CF management improved; 2) Advanced forest monitoring system introduced; 3) sustainable forest management in Cambodia and GMS enhanced	1) Project Report; 2) Technical report; 3) Field visits; 4) Evaluation report; 5) Photo pictures	1) The Facilitators/ local FA will actively participate; 2) the community will actively participate; 3) Good collaboration between IRD and relevant departments ; 4) the FA staff assigned will continue to carry out the task; 5) There will be no major calamities visiting the area; 6) the activities are according to schedule; 7) Funding on time; 8) International /national expert in position on time; 9) Avoid the risk occurring in the process of project implementation.
Objective (1): To develop a model for community forest management by strengthening CF management and testing appropriate restoration and silviculture technology	1) A model for CF management established; 2) CF management plan formulated; 3) restoration technology developed.	1) Project design report; 2) Management plan; 3) Technical report; 4) Evaluation report.	1) Fund on time; 2) Good collaboration between IRD and relevant agencies, institutes and households; 3) Avoid the risk occurring in the process of project implementation.
Output 1 Community forest management plan formulated	CF management plan formulated	Management plan	1) Fund on time; 2) Good collaboration between IRD and relevant stakeholders; 3) The management plan approved on schedule; 4) Avoid the risk occurring in the process of project implementation.
Activity 1.1 Survey current conditions of CF and its management	Field investigation made	Field investigation report	1) Fund on time; 2) Good collaboration between IRD and relevant agencies, institutes and households; 3) Chinese qualified institute or personnel available.
Activity 1.2 Formulate and print CF management Plan	CF management plan formulated	CF management plan available	1) Fund on time; 2) Good collaboration between IRD and different agencies, institutes and households; 3) Chinese qualified institute or personnel available.
Output 2 CF boundary demarcated and patrolled	100 boundary poles installed	1) Field visits; 2) Demarcating and patrolling report.	1) The CFMC have identified the area where the boundary poles will be established; 2) Good collaboration between IRD and relevant departments, as well as community; 3) Fund on time; 4) Avoid the risk occurring in the process of project implementation.

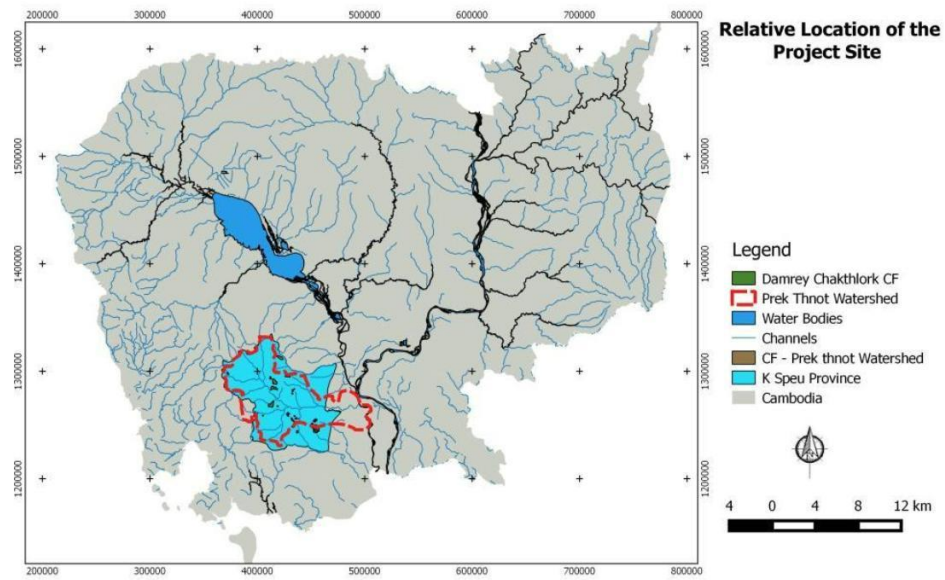
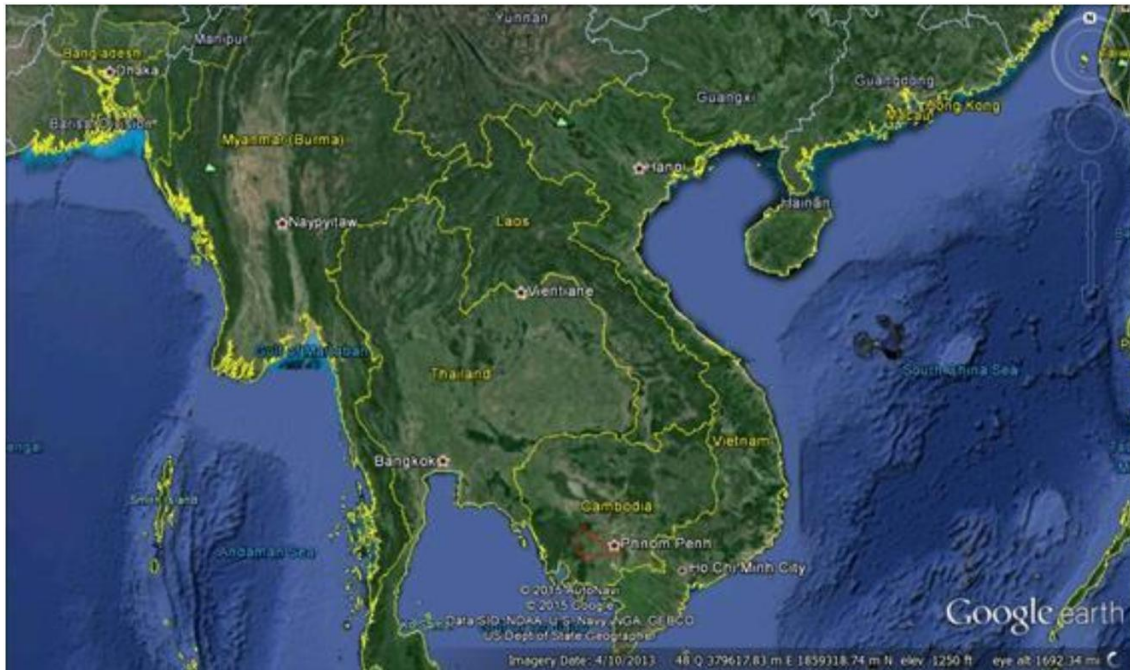
Outputs / Key Activities	Objectively verifiable indicators of achievement	Sources of information and means of verification	Assumptions
Activity 2.1 Make and install poles and billboard	Poles and billboard established	1) Field visits; 2) Project report.	1) The boundary site has been determined; 2) The design of billboard finalized; 3) Good collaboration between IRD and relevant departments; 4) Fund on time; 5) Avoid the risk occurring in the process of project implementation.
Activity 2.2 Patrol the CF	CF patrolled	Patrolling report	1) Good collaboration between IRD and relevant departments, as well as community; 2) Fund on time; 3) Avoid the risk occurring in the process of project implementation.
Output 3 A FA Triage nursery improved	FA triage nursery improved/rehabilitated	Field visits	1) Fund on time; 2) Support from FA /IRD; 3) Avoid the risk occurring in the process of project implementation.
Activity 3.1 Improve Triage nursery facilities	Nursery facilities improved/rehabilitated	Field visits	1) Fund on time; 2) Technical support from FA/IRD; 3) Avoid the risk occurring in the process of project implementation.
Activity 3.2 Raise seedlings in the nursery	Seedlings produced in the nursery	Field visits	1) Fund on time; 2) Technical support from FA/IRD; 3) Laborers available for producing seedlings
Output 4 Restoration and silviculture models established	Restoration and silviculture models established	1) Project report; 2) Field visits; 3) Technical reports; 4) Photo pictures	1) Fund on time; 2) Good coordination of FA; 3) Good cooperation between IRD and relevant parties; 4) Avoid the risk occurring in the process of project implementation.
Activity 4.1 Design and prepare soil for 3 types of degraded forestlands	Design and land preparation for the 3 types of degraded forestlands	1) Field visits; 2) Design report	1) Fund on time; 2) Good coordination of FA; 3) Good cooperation between IRD and relevant parties.
Activity 4.2 Plant and maintain restored forests	The degraded area planted and maintained	1) Field visits; 2) Technical report; 3) Photos.	1) Fund on time; 2) Planting materials ready; 3) Good cooperation between IRD and relevant parties; 4) Avoid the risk occurring in the process of project implementation
Activity 4.3 Clear, plant and tend in dense forest	The dense forest area cleared, planted and tended	1) Field visits; 2) Technical report; 3) Photos.	1) Fund on time; 2) Planting materials ready; 3) Good cooperation between IRD and relevant parties; 4) Avoid the risk occurring in the process of project implementation.
Objective(2):To mitigate the dependence of community to forests by improving household farming systems	Dependence of community on forests reduced by improving household farming system	(1) Project report; (2) Monitoring report; (3) Evaluation report; (4) Photo or video.	(1) The community will actively participate; (2) Good collaboration between IRD with relevant departments; (3) Funding on time; (4) Avoid the risk occurring in the process of project implementation.

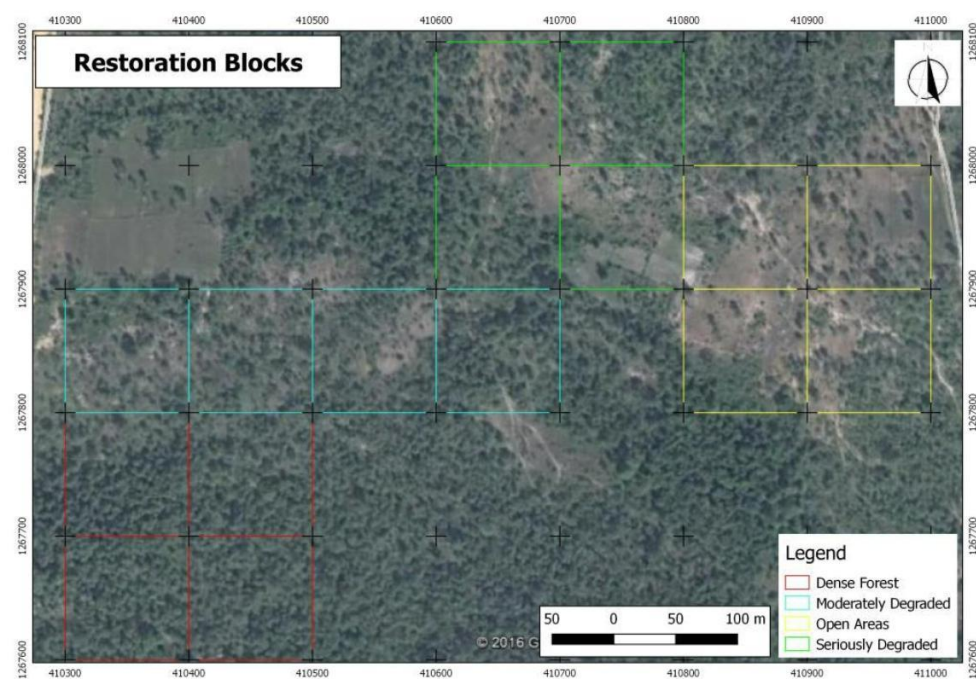
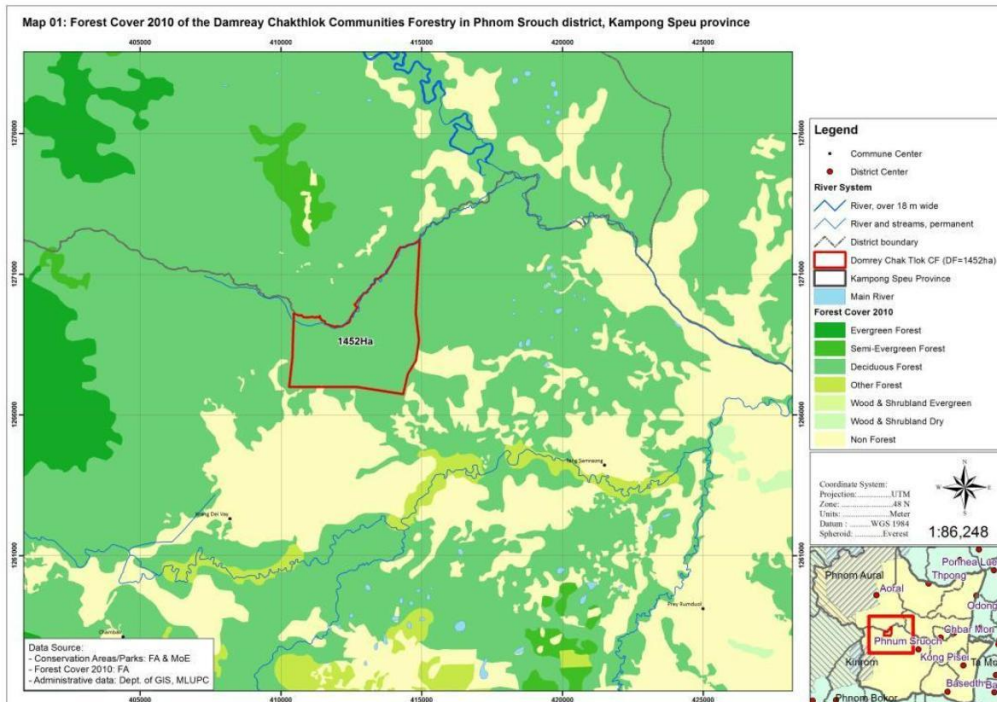
Outputs / Key Activities	Objectively verifiable indicators of achievement	Sources of information and means of verification	Assumptions
Output 5 Village water supply system established	Water supply system installed	1) Technical report; 2) Field visits; 3) Photos	(1) The design finalized and approved; (2) The community will actively participate; (3) Good collaboration between IRD with relevant departments; (4) Funding on time; (5) Avoid the risk occurring in the process of project implementation.
Activity 5.1 Stabilize pond dike and install pumping facilities	Dike stabilized and pumping facilities installed	1) Field visits; 2) Photos.	(1) The design finalized and approved; (2) The community will actively participate; (3) Good collaboration between IRD with relevant departments; (4) Funding on time; (5) Avoid the risk occurring in the process of project implementation.
Activity 5.2 Lay out main water pipe from the pond to the village	Water distribution system installed	1) Field visits; 2) Photos.	(1) The design finalized and approved; (2) The community will actively participate; (3) Good collaboration between IRD with relevant departments; (4) Funding on time; (5) Avoid the risk occurring in the process of project implementation.
Output 6 Agroforestry farming system established	Agroforestry farming system established	(1) Project report; (2) Field visits.	(1) The farmer households are committed to participate; (2) Good technical support from IRD/FA; (3) Funding on time; (4) Avoid the risk occurring in the process of project implementation.
Activity 6.1 Prepare soil, irrigation facilities and seedlings (including import)	(1) Land preparation made; (2) Irrigation facilities installed; (3) Seedlings produced.	(1) Project report; (2) Field visits.	(1) The farmer households are committed to participate; (2) Irrigation facilities and seedlings prepared; (3) Good technical support from IRD/FA.
Activity 6.2 Plant and maintain cash trees and vegetables	Cash trees and vegetables planted and maintained	(1) Project report; (2) Field visits; (3) Photos.	(1) The farmer households are committed to participate; (2) Seedlings distributed; (3) Good technical support from IRD/FA.
Output 7 Homegarden farming system established	Homegarden farming system established	(1) Project report; (2) Field visits; (3) Photos.	(1) the farmer households are committed to participate; (2) Good technical support from IRD/FA.
Activity 7.1 Prepare soil, irrigation facilities and seedlings		(1) Project report; (2) Field visits; (3) Photos.	(1) the farmer households are committed to participate; (2) irrigation facilities and seedlings prepared; (3) Good technical support from IRD/FA.
Activity 7.2 Plant and maintain cash trees and peppers		(1) Project report; (2) Field visits; (3) Photos	(1) the farmer households are committed to participate; (2) seedlings distributed; (3) Good technical support from IRD/FA.

Outputs / Key Activities	Objectively verifiable indicators of achievement	Sources of information and means of verification	Assumptions
Objective (3):To enhance forest protection through adopting advanced forest monitoring system (forest Watcher)	1) Forest watcher system installed and become operational; 2) Image data collected.	1) Project report; 2) Technical report; 3) Monitoring report; 4) Evaluation report.	1) Design finalized and approved; 2) Fund on time; 3) Technical assistance by Chinese experts; 4) Good collaboration between IRD and relevant departments.
Output 8 Forest watcher system and auxiliary facilities installed and maintained	Forest watcher system become operational and maintained	1) Project report; 2) Field visits; 3) Photos.	1) Technical assistance provided by Chinese experts; 2) The design approved; 3) Fund on time; 4) Good collaboration between IRD and relevant departments; 5) Avoid the risk occurring in the process of project implementation.
Activity 8.1 Survey, design and construct auxiliary facilities	Design for the system installation	Operational plan	1) Technical assistance provided by Chinese experts; 2) Good collaboration between IRD and relevant departments; 3) Fund on time
Activity 8.2 Deliver and install forest watcher system	Forest watcher system installed	1) Field visits; 2) Photos.	1) Technical assistance provided by Chinese experts; 2) Good collaboration between IRD and relevant departments; 3) Fund on time; 4) Avoid the risk occurring in the process of project implementation.
Activity 8.3 Test system, train personnel, and process data/images	1) Training carried out on the use of the system; 2) The forest watcher system tested; 3) Data collected.	1) Training manual; 2) Technical report.	1) Technical assistance provided by Chinese experts; 2) Good collaboration between IRD and relevant departments; 3) Fund on time; 4) Avoid the risk occurring in the process of project implementation.
Activity 8.4 Maintain and repair the watcher system	The system maintained		1) Local technicians are available to maintain or repair the forest watcher; 2) Technical assistance provided by Chinese experts; 3) Good collaboration between IRD and relevant departments; 4) Fund on time; 5) Avoid the risk occurring in the process of project implementation.
Objective(4):To extend achievements and related techniques in Cambodia and GMS by demonstration and experiences sharing	1) Project experience learned prepared and compiled; 2) Information dissemination conducted; 3) IEC materials produced; 4) GMS workshop; 5) Project staff visit exchange to other GMS countries.	1) Documentation Reports; 2) GMS workshop report; 3) Photo and video; 4) Evaluation report.	1) The lessons learned are properly documented; 2) There will be continuity of the staff working with the project; 3) Fund available; 4) Good collaboration between IRD and relevant departments.
Output 9 An integrated forest	A technical handbook for integrated	Technical handbook	1) Good collaboration between IRD and relevant departments; 2) Fund

Outputs / Key Activities	Objectively verifiable indicators of achievement	Sources of information and means of verification	Assumptions
management technology assembled and a	forest management technology		available .
Activity 9.1 Summarize technologies of CF restoration and silviculture and	Data and information on Experience learned from project prepared	1) Project report; 2) Evaluation report.	1) Good collaboration between IRD and relevant departments, as well as community; 2) Fund available.
Activity 9.2 Formulate technical handbooks for integrated CF management and for the watcher operation	Technical handbooks for CF management and forest watcher operation formulated	1) Technical handbooks; 2) Project report.	1) Good collaboration between IRD and relevant departments, as well as community; 2) Fund available.
Output 10 Experience and technology demonstrated and disseminated	Experience and technology demonstration and dissemination	1) Materials; 2) Field visits; 3) Evaluation report.	1) Good collaboration between IRD and relevant departments; 2) Fund available
Activity 10.1 Organize workshops and field visits of domestic foresters	Field visits for domestic foresters	Project report	1) Good collaboration between IRD and relevant departments; 2) Fund available
Activity 10.2 Publish a book of <i>Community Forestry Development in Cambodia</i>	A book of <i>Community Forestry Development in Cambodia</i> published	Book available	1) Good collaboration between IRD and relevant parties; 2) International/national experts support; 3) Fund available.
Activity 10.3 Draft and submit a policy recommendation of CF management to FA	A policy recommendation of CF management drafted and submitted to FA	1) Drafted policy; 2) Report submitted.	1) Good collaboration between IRD and relevant departments; 2) International/national experts support; 3) Fund available.
Activity 10.4 Participate in APFNet's project experience sharing conferences	APFNet's project conferences organized	Project presentations; Conference reports	1) Project team in IRD is well informed; 2) Fund available.







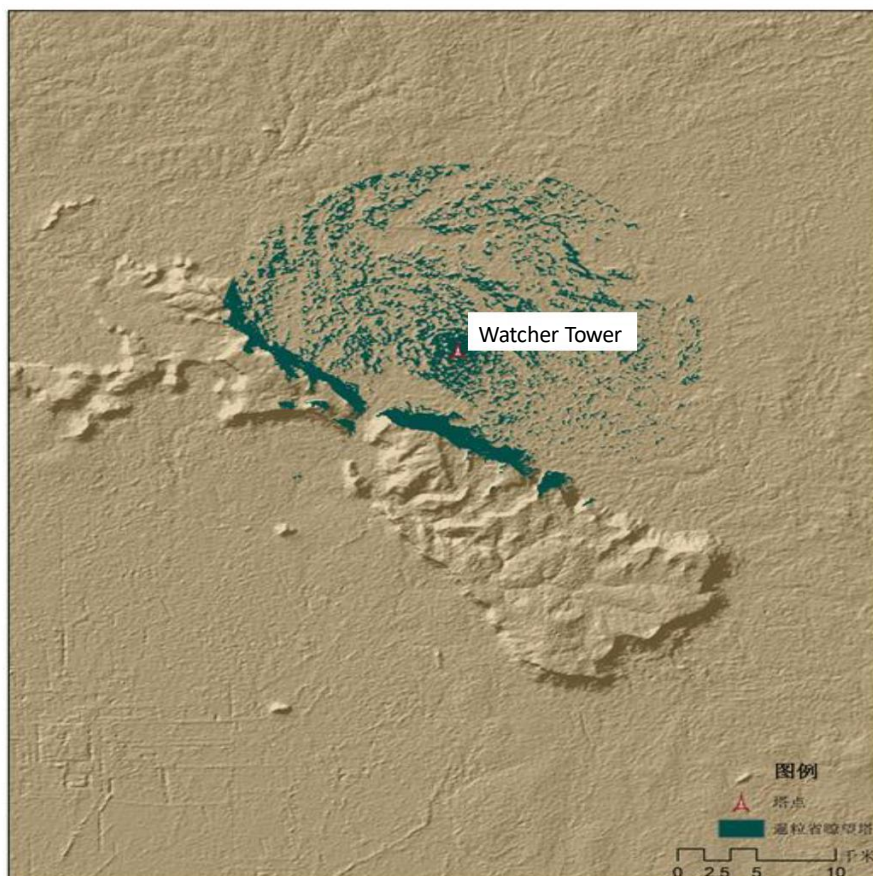
## Demonstration Sites for Agroforestry and Homgarden Farming Systems and Water Supply System in Dokpor Village





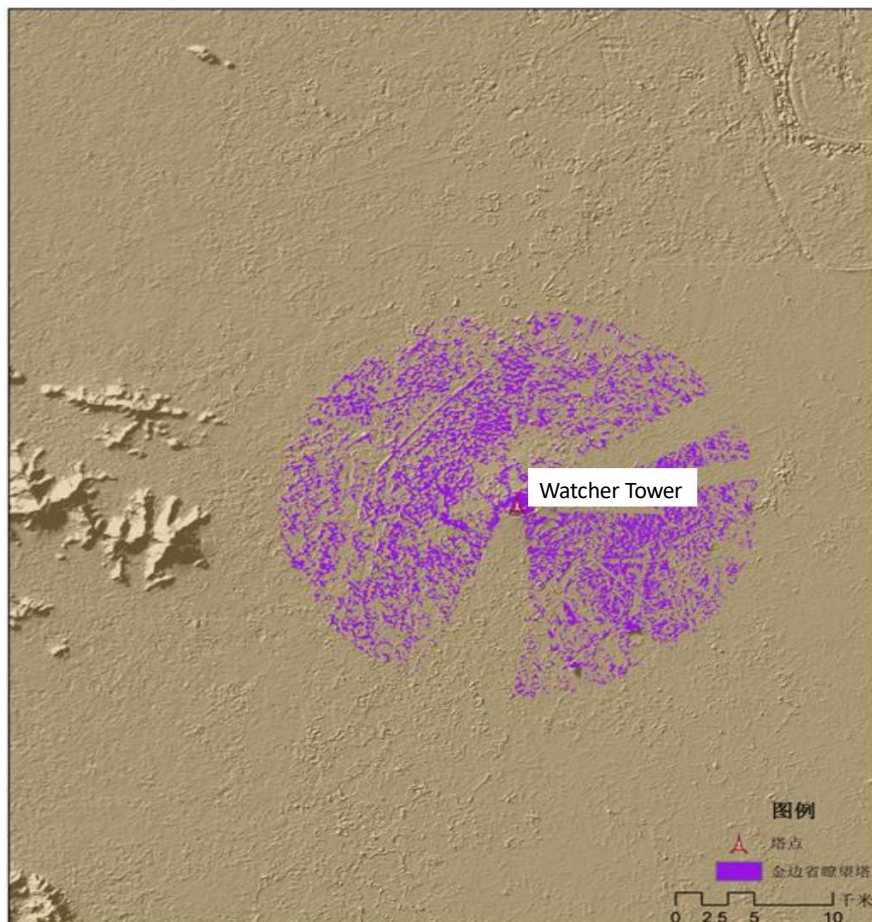
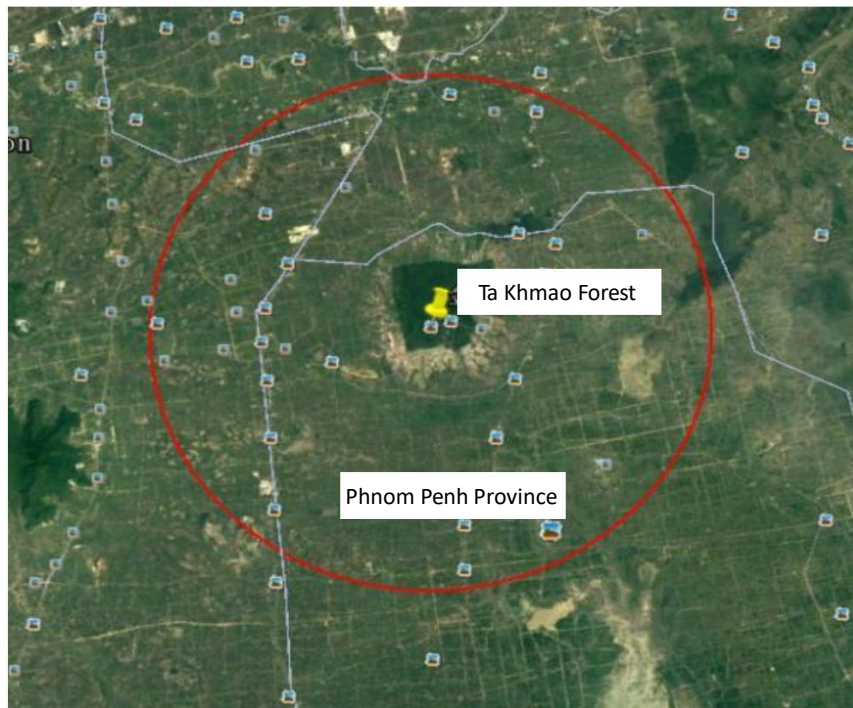
## Forest Watcher #1: Location and watching areas (Siem Reap Province):

The first forest watcher system is to be constructed and installed in Khun Ream Forest Research Station, Khet, Siem Reap Province (Latitude:13°43'54.40"N; Longitude:104°04'59.95"E).



## Forest Watcher #2: Location and watching areas (Phnom Penh Province):

The second forest watcher system is to be constructed and installed in Tamao zoo forest, Phnom Penh Province (latitude: 11°17'59.20"N; longitude: 104°47'26.44E).







## សម្រេច

### ប្រការ ១..

បង្កើតតំបន់ព្រៃសហគមន៍ក្នុងខេត្តកំពង់ស្ពឺ សម្រាប់ធ្វើការគ្រប់គ្រងប្រកបដោយនិរន្តរភាព តាមលក្ខណៈសហគមន៍ព្រៃឈើ ដែលមានទីតាំងស្ថិតនៅក្នុងផ្នែករដ្ឋបាលព្រៃឈើឱវ៉ាល់និងផ្នែក រដ្ឋបាលព្រៃឈើបរសេដ្ឋនៃខណ្ឌរដ្ឋបាលព្រៃឈើកណ្តាល ។

### ប្រការ ២..

ការបង្កើតតំបន់ព្រៃសហគមន៍នេះមានគោលបំណង ៖

- គ្រប់គ្រង ប្រើប្រាស់ ការពារ ថែរក្សា អភិរក្សជីវចម្រុះនិងអភិវឌ្ឍព្រៃសហគមន៍ឲ្យមាន និរន្តរភាព
- ប្រើប្រាស់ផល អនុផលព្រៃឈើ ជាលក្ខណៈប្រពៃណីសម្រាប់ការរស់នៅទំនៀមទម្លាប់និង ជំនឿសាសនា
- ទាញយកផល អនុផលព្រៃឈើ ស្របតាមលទ្ធភាពធនធាន និងសក្តានុពលព្រៃសហគមន៍
- គាំទ្រដល់គោលនយោបាយរបស់រាជរដ្ឋាភិបាលក្នុងការកាត់បន្ថយភាពក្រីក្រ ។

### ប្រការ ៣..

តំបន់ព្រៃសហគមន៍ក្នុងខេត្តកំពង់ស្ពឺនៃប្រកាសនេះមានបី(៣)សហគមន៍ព្រៃឈើ ចែកចេញ ជាបីកន្លែងដែលមានផ្ទៃដីសរុបចំនួន ២២០៣ (ពីរពាន់បួនរយបី)ហិកតា ដូចមានក្នុងផែនទីភ្ជាប់ជា ឧបសម្ព័ន្ធ១នៃប្រកាសនេះ និងជាប្រព័ន្ធខ្សែព្រំបិទជិតកំណត់ដោយចំណុចគោលនិងនិយាមកាដូច បានកំណត់ក្នុងឧបសម្ព័ន្ធ២នៃប្រកាសនេះ ។ ក្នុងករណីមានការចាំបាច់ព្រមទល់ព្រៃសហគមន៍ដូច បានកំណត់ក្នុងឧបសម្ព័ន្ធ២នៃប្រកាសនេះ អាចកែសម្រួលបានតាមការជាក់ស្តែង ។

### ប្រការ ៤..

ដំណើរការរៀបចំនិងការប្រព្រឹត្តទៅនៃសហគមន៍ព្រៃឈើក្នុងតំបន់ព្រៃសហគមន៍នៃប្រកាស នេះ ត្រូវអនុវត្តតាមនីតិវិធីដូចបានកំណត់នៅក្នុងច្បាប់ស្តីពីព្រៃឈើ អនុក្រឹត្យស្តីពីការគ្រប់គ្រង សហគមន៍ព្រៃឈើ និងប្រកាសស្តីពីគោលការណ៍ណែនាំអំពីសហគមន៍ព្រៃឈើ ។

### ប្រការ ៥..

ប្រកាស ឬសេចក្តីសម្រេចទាំងឡាយណាដែលមានខ្លឹមសារផ្ទុយនឹងប្រកាសនេះត្រូវទុកជា និរាករណ៍ ។

**ប្រការ ៦..**

អគ្គលេខាធិការ អគ្គាធិការ នាយកខុទ្ទកាល័យ ប្រធានរដ្ឋបាលព្រៃឈើ ប្រធាននាយកដ្ឋាន  
នីតិកម្មកសិកម្ម ប្រធាននាយកដ្ឋានផែនការនិងស្ថិតិ ប្រធានអង្គភាពក្រោមឱវាទក្រសួងកសិកម្ម  
រុក្ខាប្រមាញ់ និងនេសាទ ដែលពាក់ព័ន្ធ និងប្រធានមន្ទីរកសិកម្ម រុក្ខាប្រមាញ់ និងនេសាទ ត្រូវអនុវត្តប្រកាសនេះ  
តាមភារកិច្ចរៀងៗខ្លួនចាប់ពីថ្ងៃចុះហត្ថលេខាតទៅ ។

រាជធានីភ្នំពេញ ថ្ងៃទី ១១ ខែ កញ្ញា ឆ្នាំ ២០១៣



**អន្តេងទទួល**

**ជិត្តៈ ហ៊ាន**

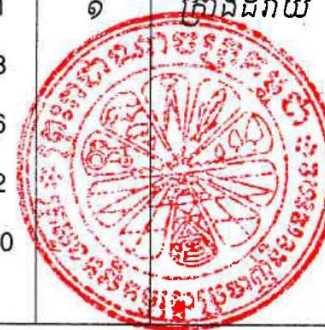
- ក្រសួងព្រះបរមរាជវាំង
- អគ្គលេខាធិការដ្ឋានព្រឹទ្ធសភា
- អគ្គលេខាធិការដ្ឋានរដ្ឋសភា
- ទីស្តីការគណៈរដ្ឋមន្ត្រី
- ក្រសួងមហាផ្ទៃ
- ក្រសួងការពារជាតិ
- ក្រសួងសេដ្ឋកិច្ច និងហិរញ្ញវត្ថុ
- ក្រសួងរៀបចំដែនដី នគរូបនីយកម្ម និងសំណង់
- ក្រសួងបរិស្ថាន
- សាលារដ្ឋបាលខេត្តកំពង់ស្ពឺ
- ដូចប្រការ ៦
- ឯកសារ កាលប្បវត្តិ



ឧបសម្ព័ន្ធ ២ ៖ ភ្ជាប់ប្រកាសលេខ ..... ចុះថ្ងៃទី ..... ខែ ..... ឆ្នាំ.....

### ទីតាំងព្រៃសហគមន៍ក្នុងខេត្តកំពង់ស្ពឺ

លរ	ឈ្មោះសហគមន៍ ព្រៃឈើ	ផ្ទៃដី (ហិកតា)	ចំណុចនិយាមកា ទីតាំងព្រៃសហគមន៍				ចំនួន ភូមិ	ចំនួន ឃុំ	ចំនួន ស្រុក	ផ្នែករដ្ឋបាល ព្រៃឈើ
១	សែនមនោរម្យ	៤៤៧	418106 1285016	416721 1283318	417279 1282479	419042 1283195	១	ហោងសំណាំ	ឱរ៉ាល់	ឱរ៉ាល់
			417888 1285050	416947 1283298	417724 1282648	419061 1283256				
			417686 1284953	417275 1283120	419031 1282574	418956 1283501				
			417479 1285107	417335 1283125	418235 1282521	418470 1283548				
			417228 1284872	417488 1283007	418477 1282351	418460 1283964				
			416925 1284907	417445 1282912	418581 1282304	418343 1284387				
			416535 1284167	417367 1282873	418856 1282322	418261 1284632				
			416342 1283659	417371 1282776	418950 1282495	418227 1284802				
			416417 1283534	417281 1282637	419000 1282688	417995 1284838				
			416411 1283448	417290 1282536	418989 1282764					
២	ដំរីចាក់ធ្លក	១.៤៥២	415278-1269000	413061-1266546	412408-1268842	412886-1270811	១	ត្រាំងដីវ៉ាយ	ភ្នំស្រួច	បរសេដ្ឋ
			415324-1268345	410609-1266681	412886-1269152	412886-1271293				
			415219-1267613	410691-1267671	412886-1269616	412886-1271636				
			414913-1267152	410881-1269293	412886-1270026	412886-1271722				
			414596-1266116	411792-1269200	412886-1270519	412886-1269000				



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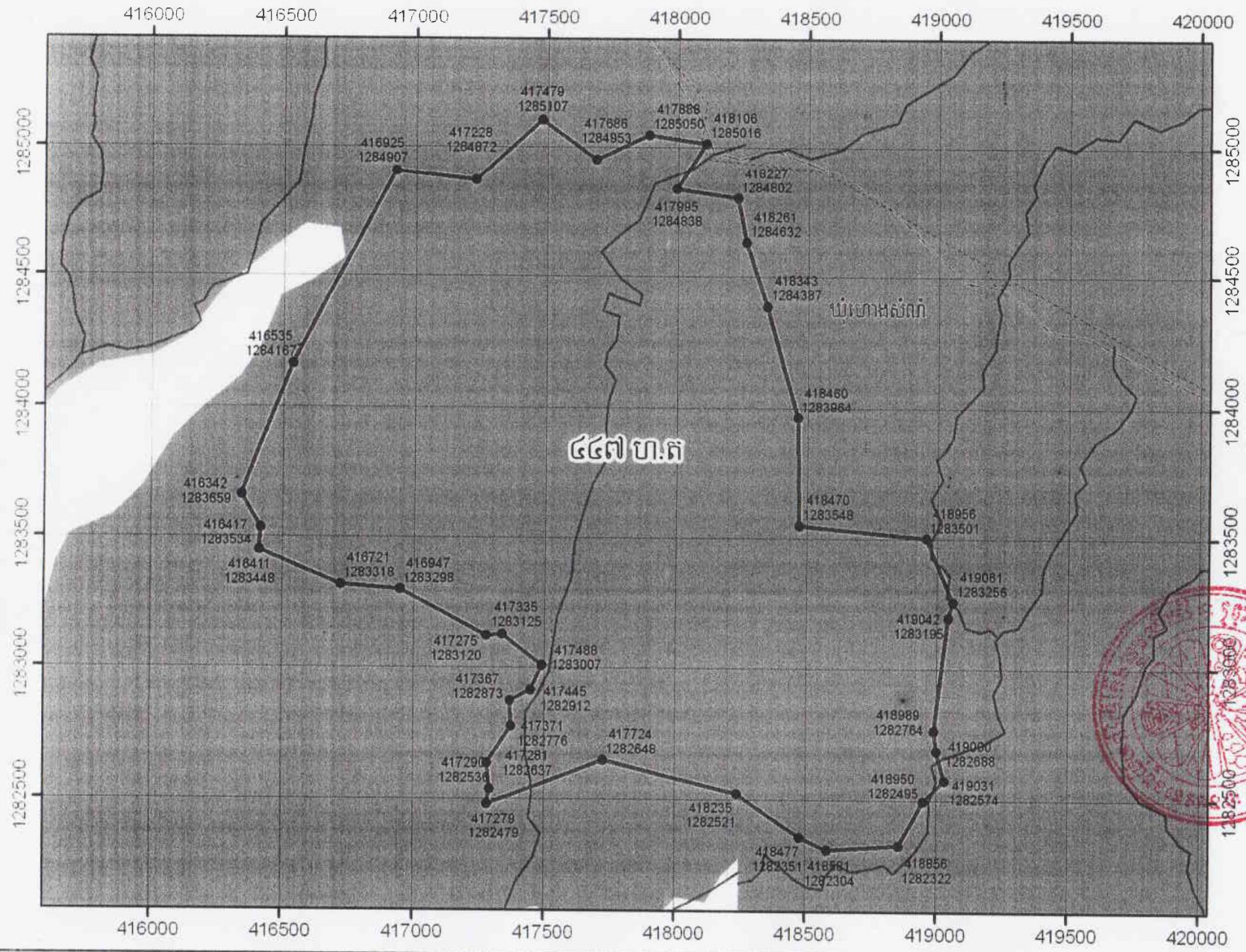
លរ	ឈ្មោះសហគមន៍ ព្រៃឈើ	ផ្ទៃដី (ហិកតា)	ចំណុចនិយាមកា ទីតាំងព្រៃសហគមន៍				ចំនួន ភូមិ	ចំនួន ឃុំ	ចំនួន ស្រុក	ផ្នែករដ្ឋបាល ព្រៃឈើ
៣	ជ្រោះដំបង	៥០៤	433746-1250551	435012-1248253	433241-1247443	432666-1248844	១	ជាំសង្កែ	ភ្នំស្រួច	បរសេដ្ឋ
			433913-1250640	434747-1248459	433123-1247487	433000-1248966				
			434315-1250500	434530-1248269	433005-1247670	433703-1249490				
			434504-1250323	434534-1247871	432700-1247699	433666-1250157				
			435114-1248525	434316-1247797	432352-1247881	433687-1250362				
			435310-1248372	434319-1247386	432315-1248024					
			435296-1248260	433724-1247395	432483-1248595					
	សរុប	២.៤០៣					៣	៣	២	២



W



# ផែនទី ព្រំសហគមន៍សែនមនោរម្យ ស្ថិតនៅឃុំហោងសំណំ ស្រុកឡិវាល ខេត្តកំពង់ស្ពឺ



- សញ្ញាសម្គាល់**
- ចំណុចប្រភេទព្រំ
  - ព្រំប្រទល់ឃុំ
  - ផ្លូវ
  - ផ្លូវថ្នល់
  - ព្រំប្រទល់ស្រុក
  - កម្រិតប្រមាណ ២០០២
  - ព្រៃស្រោច
  - ព្រៃពេកកណ្តាលស្រោច
  - ព្រៃឈូក
  - ព្រៃឆ្នាំងឡូត
  - អំបូរស្រែចម្ការ



Coordinate System:  
Zone: 48P  
Projection: UTM  
Map Datum: Indian 1960

សម្ព័ន្ធទ្រឹមត្រូវ 1:20,000

0 350 700  
Meters

25



# ផែនទី ព្រំសហគមន៍ជម្រកអ្នកស្វិតនៅក្នុងឃុំក្រវាងជីវ៉ាម ស្រុកភ្នំស្រួច ខេត្តកំពង់ស្ពឺ



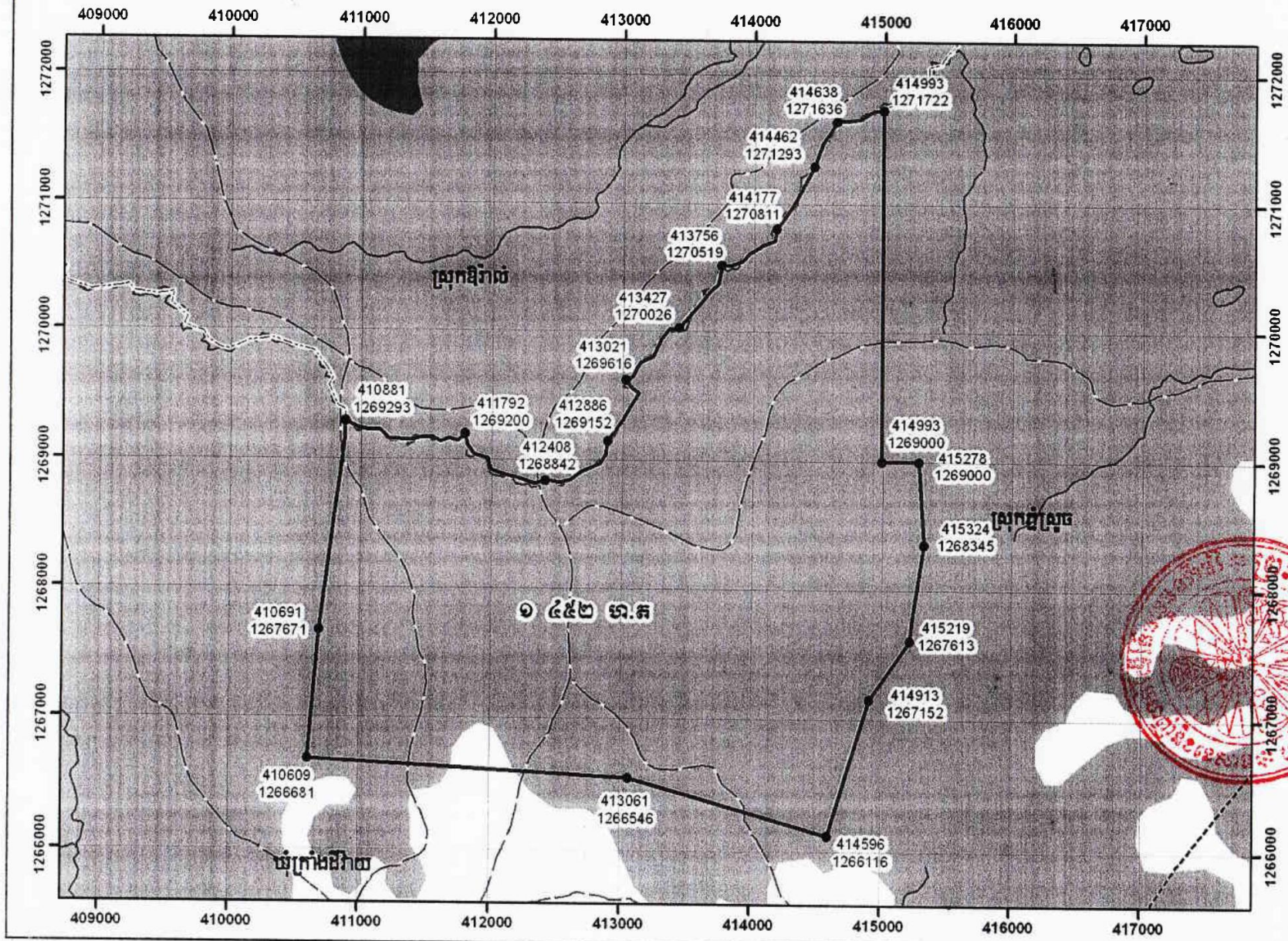
**សញ្ញាសំគាល់**

- ចំណុចទិន្នន័យ
- ព្រំប្រទល់ស្រុក
- - - ព្រំប្រទល់ឃុំ
- ផ្លូវ
- ផ្លូវទឹក
- ព្រំប្រទល់សហគមន៍

**គម្របព្រៃឈើឆ្នាំ ២០០២**  
ព្រៃឈ្មោះ  
ដីក្លាស់គម្របព្រៃ

Coordinate Systems  
Zone: 48P  
Projection: UTM  
Map Datum: Indian 1960

**មាត្រដ្ឋាន 1:40,000**  
0 0.25 0.5 1 Km





# ផែនទី ព្រំសហគមន៍ស្រូវដំបង ស្ថិតនៅក្នុងឃុំជ្រៃស្តៅ ស្រុកគំរូស្រួច ខេត្តកំពង់ស្ពឺ



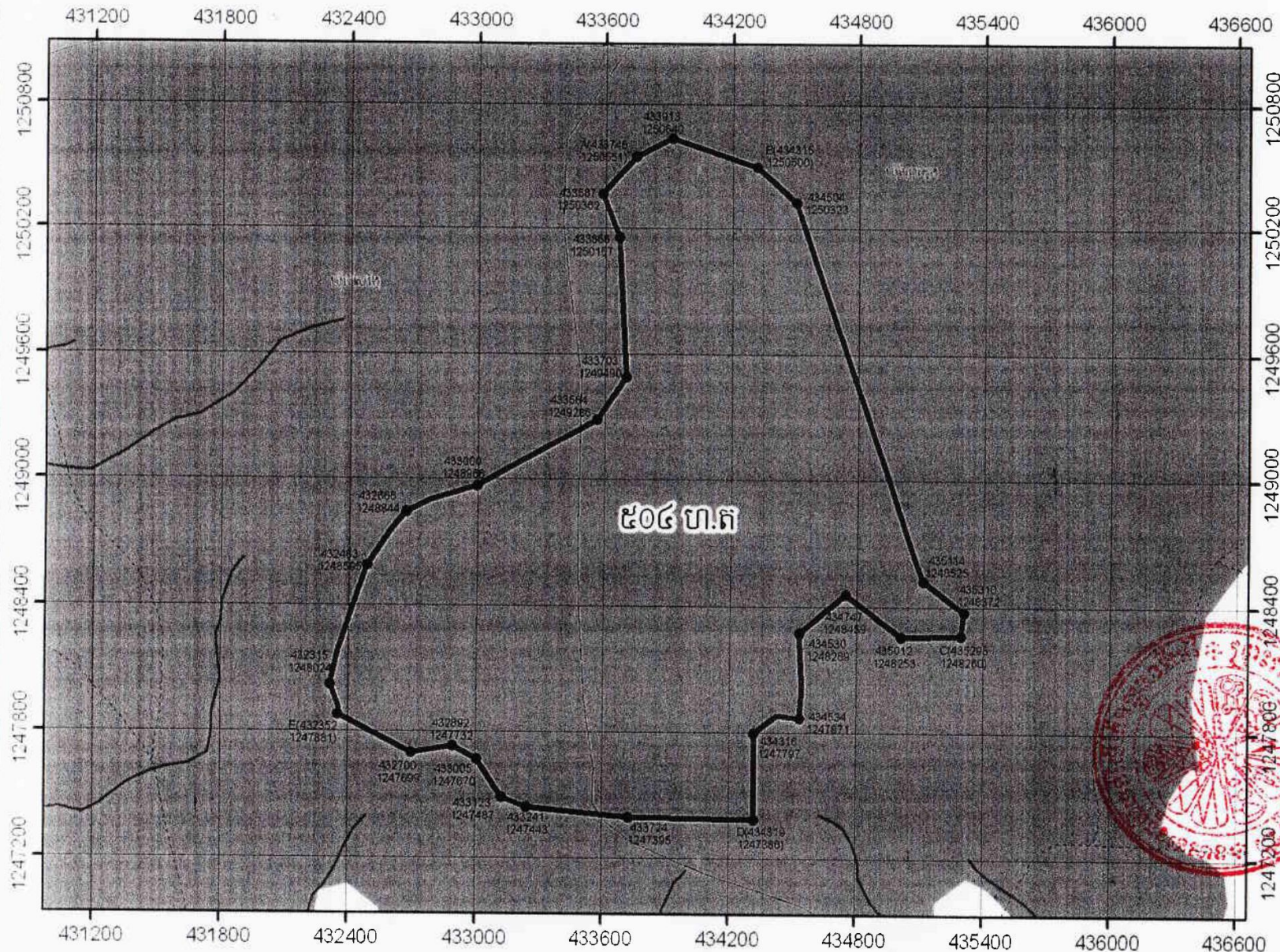
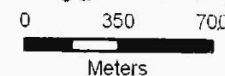
## សញ្ញាសម្គាល់

- ចំណុចដើមរោងកាត
- ព្រំប្រទល់ឃុំ
- ទីរួម
- ផ្លូវថ្នល់
- ព្រំប្រទល់ព្រំប្រទល់រដ្ឋ
- កម្រិតប្រែប្រួល ១០០០២
- ព្រំប្រទល់
- ទីក្រុងកម្រិតប្រែប្រួល



Coordinate Systems  
Zone: 48P  
Projection: UTM  
Map Datum: Indian 1960

មាត្រដ្ឋាន 1:26,000







*Asia-Pacific Network for Sustainable Forest  
Management and Rehabilitation*

## **Annex E**

# **Integrated Forest Ecosystem Management Planning and Demonstration Project in Greater Mekong Sub-region (Cambodia)**

## **Project Implementation Plan**

**Institute of Forest and Wildlife Research and Development  
Forestry Administration, Cambodia**

**April 18, 2017**

## Contents

<b>Output 1 CF Management Plan formulated .....</b>	<b>1</b>
Activity 1.1 Survey current conditions of CF and its management .....	2
Activity 1.2 Formulate and print CF Management Plan .....	3
<b>Output 2 CF boundary demarcated and patrolled.....</b>	<b>3</b>
Activity 2.1 Make and install poles and billboard .....	3
Activity 2.2 Patrol the CF .....	4
<b>Output 3 A FA Triage nursery improved.....</b>	<b>5</b>
Activity 3.1 Improve Triage nursery facilities .....	5
Activity 3.2 Raise seedlings in the nursery.....	5
<b>Output 4 Restoration and silviculture models established .....</b>	<b>6</b>
Activity 4.1 Design and prepare soil for 3 types of degraded forestlands.....	7
Activity 4.2 Plant and maintain restored forests .....	9
Activity 4.3 Clear, plant and tend in dense forest .....	9
<b>Output 5 Village water supply system established .....</b>	<b>10</b>
Activity 5.1 Stabilize pond dike and install pumping facilities.....	11
Activity 5.2 Lay out main water pipe from the pond to the village .....	11
<b>Output 6 Agroforestry farming system established.....</b>	<b>12</b>
Activity 6.1 Prepare soil, irrigation facilities and seedlings (including import) .....	12
Activity 6.2 Plant and maintain cash trees and vegetables.....	13
<b>Output 7 Homegarden farming system established .....</b>	<b>13</b>
Activity 7.1 Prepare soil, irrigation facilities and seedlings.....	14
Activity 7.2 Plant and maintain cash trees and peppers.....	15
<b>Output 8 Forest watcher system and auxiliary facilities installed and maintained ..</b>	<b>15</b>
Activity 8.1 Survey, design and construct auxiliary facilities.....	16
Activity 8.2 Deliver and install forest watcher system .....	16
Activity 8.3 Test system, train personnel, and process data/images.....	17

Activity 8.4 Maintain and repair the watcher system.....	17
<b>Output 9 An integrated forest management technology assembled and a technical handbook formulated .....</b>	<b>18</b>
Activity 9.1 Summarize technologies of integrated CF management and experiences of watcher construction .....	18
Activity 9.2 Formulate technical handbooks for integrated CF management and for the watcher operation.....	19
<b>Output 10 Experience and technology demonstrated and disseminated .....</b>	<b>19</b>
Activity 10.1 Organize workshops and field visits of domestic foresters.....	20
Activity 10.2 Publish a book of <i>Community Forestry Development in Cambodia</i> .....	21
Activity 10.3 Draft and submit a policy recommendation of CF management to FA.....	21
Activity 10.4 Participate in APFNet's project experience sharing activities.....	22
<b>Internal monitoring.....</b>	<b>23</b>
<b>External evaluation .....</b>	<b>23</b>

The goal of this project is to rehabilitate ecological services and product provision of forests in Cambodia through improvement of community forest management and strengthening state-owned forest conservation, so as to contribute to sustainable forest management in the Greater Mekong Sub-region. Improvement of community forest management will be achieved through developing restoration technologies and demonstrating integrated management models in Damrey Chakthlork Community Forest (CF), which covers a total CF area of approximately 1,452 hectares. Conservation of state-owned forests will be realized through installing and demonstrating forest watcher systems in Khun Ream and Ta Khmao respectively, where a total of 4,368 hectares of state-owned forests will be on-time monitored.

To ensure such contribution to the integrated management of Lancang-Mekong watershed, four objectives are to be realized. The project objectives include: A. To develop a model for community forest management by strengthening CF management and testing appropriate restoration and silviculture technology; B. To mitigate the dependence of community to forests by improving household farming systems; C. To enhance forest protection through adopting advanced forest monitoring system (Forest Watcher); and D. To extend achievements and related techniques in Cambodia and GMS by demonstration and experiences sharing.

To realize objectives, in addition to the outputs such as project management and publicity, a series of project activities will be carried out to obtain the following 10 project outputs: 1. A community forest management plan, 2. A 1,452 ha of demarcated and patrolled CF, 3. An improved FA Triage nursery, 4. Four restoration and silviculture models, 5. A water supply system in Dokpor village, 6. A demonstration of agroforestry farming system, 7. A demonstration of homegarden farming system, 8. Two sets of forest watcher systems and auxiliary facilities for monitoring the state-owned forests,, 9. Technical manuals for CF management and watcher system operation, and 10. Relevant experiences and technologies.

To obtain these 10 project outputs, the Project Implementation Plan is therefore drafted to guide the activity implementation on sites.

## **Output 1 CF Management Plan formulated**

### **Significance**

Community forest is an inevitable component of national vegetation in Cambodia and plays an important role in Lancang-Mekong watershed maintenance. Forestry administration at all levels and local governments are aware of the significance of CF management. CF is not managed in a very good manner currently because of lack of fund, awareness, and sound plan. The project aiming to improve CF management needs to be started with an integrated management plan. While guiding the actions in targeted CF, the management plan produced in this project will hopefully become a template for other CF planning, so as to enhance CF management in Cambodia and even in the whole Lancang-Mekong watershed.

### **Basic information**

The site chosen to implement CF management in this project is located in Dokpor Village, Krangdeivay Commune, Phnom Srouch District, Kampang Speu Province, Cambodia. The total area of this piece of community forest is approximately 1,452 hectares. There are three documents available for this CF management, i.e., An Agreement on CF Management among Villagers, An Agreement on CF Management between Local FA and the Community, and A CF Management Plan generated with the assistances from local FA. However, conditions of forest stands are not well investigated, linkages between community and forest are not well analyzed, and actions to be taken are not specified and deployed in a concrete spot, which brought about difficulties to implement consistent and effective actions.

### **Methodology**

With the aims to provide a comprehensive solution for improving the stand quality, increasing forest stocks, and enhancing its ecological services and product provisions, the management plan is going to be generated through close cooperation among Chinese qualified planning institution, IRD, local FA, and community. During the planning process, a full investigation of forest stands and land uses will be carried out, and a traditional uses of forest resources will be surveyed, while existing agreements and management plan will be used as an important background and reference.

### **Planning area**

The total area to be planned is 1,452 hectors, which covers full area of CF of Dokpor Village.

### **Planning precision**

All actions are to be generated based on the current situations of CF and combined with the planning objectives. Actions in the plan will be deployed in a specified scope with their corresponding geographical coordinates. All potential strategies/methodologies for each action will be given in the plan.

**Planning period:** 10 years.

## **Activity 1.1 Survey current conditions of CF and its management**

- **Investigation content:** Current conditions of CF are crucial to generate a sound management plan. Investigation covers the current conditions both inside the forests and outside the forests.
- **Methods:** Forest investigation will be carried out with the methods of sample plot investigation and management zoning. Management conditions will be investigated by interviewing and collecting second-hand information/materials.
- **Activity organization:** An investigation and planning team will be organized with the participation of qualified Chinese forestry planning experts, IRD professionals, local FA staffs, and villagers. The Chinese expert will be the team leader to guide the whole process and responsible for bringing in knowledge and techniques for CF planning.
- **Timeframe:** The activity will be conducted on the first year of the project.

- **Budget:** \$ 10,350
  - APFNet: International consultancy: International Travel: \$ 2000 (\$ 1000/person×2persons); Food and lodging: \$ 3150 (\$ 225×7 days×2person) ;travel expense of project staff: \$ 3200 (\$ 80/day× 20days×2persons);vehicle rental: \$ 2000 (\$ 100/day ×20 days)

## Activity 1.2 Formulate and print CF Management Plan

- **Principle:** Under the goal of enhancing ecological services and product provisions, the CF Management Plan of Dokpor Village will follow the principles of combining modern forestry management theories with the reality of CF management practices, integrating experts' view and local residents' opinions.
- **Methods:** Based on full understanding of forest conditions, management status, and willingness of management, the CF Management Plan of Dokpor Village will be formulated by using participatory approaches. Especially group discussions will be regularly carried out with the participation of various stakeholders and experts. At the end, the Plan should be approved by external expert committee and accepted by the local villagers.
- **Timeframe:** The activity will be conducted on the first year of the project.
- **Budget:** \$ 60,984
  - APFNet: Management Plan formulation: \$ 60,984 (\$ 42/ha×1452ha)

## Output 2 CF boundary demarcated and patrolled

### Significance

The demarcation and patrol of community forests bring a signal to declare the identity of CF, which will put a foundation to strengthen the management of CF. Besides preventing CF from encroachment, boundary poles and billboard to be established will increase villagers' awareness of forest conservation.

### Basic information

Community forests were disrupted historically by land encroachment, cutting, grazing, and collecting, etc. To prevent CF from those disturbances, actions of demarcation have been listed in the existing management plan of CF since it was formulated. It is, however, not conducted because of lack of funds. The project will support such actions to strengthen the plan implementation.

### Methodology

The boundary poles will be made and installed in the selected spots at the boundary of CF. The ground total of boundary poles to be installed is about 100. The installation will be conducted by community members.

## Activity 2.1 Make and install poles and billboard

- **Description:** The CF is going to be demarcated through establishment of billboards and cement poles. Billboards will be established in strategic locations



to inform the public of the boundary of the CF, on which the map of CF and the logo of APFNet will be concluded. Cement poles are installed at the boundary of CF.

- **Technical requirements:** Boundary poles will be made of cements and iron stick, and coded in numbers with color paint. A total of approximately 100 poles will be installed at the boundary of CF clockwise. The billboard will be implemented in the area where are at high risk of being encroached. Approximately 2 billboards will be installed in strategic areas.
- **Participants:** The installation of the billboards and boundary poles will be conducted by the CF members. The project will provide a budget for the design of the billboards and production of boundary poles.
- **Timeframe:** The installation will be conducted on the first year of the project.
- **Budget:** \$ 6,900
  - APFNet: Cost of cement poles(including installation): \$ 4500( 100 posts× \$ 45); cost for billboards: \$ 800(2billboards × \$ 400/unit);travel expense: \$ 6800(\$ 80/person× 2 persons× 10 days)

## Activity 2.2 Patrol the CF

- **Description:** The community will be supported in their patrol works of the area. This includes patrolling the CF areas particularly the restoration plots from stray animals and illegal cutters.
- **Rationale of the Activity:** Assistance will be provided to the community on patrol works considering that the CF does not yet provide steady income.
- **Detailed Implementation Approach:** The community members will submit periodic report on the patrol operations. A camera with GPS will be provided to the community. They will be required to take pictures of any interesting features that they observed in the area. These include forest fire, illegal cutting encroachment and other forms of forest disturbance. In addition, the pictures will be taken on wildlife that are observed in the site. Before handing the camera with GPS, the community will be trained on how to use it. The photos in the camera will be copied by the Project Staff. The geo-tagged photos will be stored in the computer. These will then be uploaded and stored in the GIS. A regular report will be generated indicating the result of the patrol operation of the community members (i.e. trend of the transgressions and observation of wildlife).
- **Participants:** The patrol operation will be conducted by the CF Management committee. The processing of the geo-tagged images will be conducted by the project staffs.
- **Timeframe:** The regular patrol operation will be conducted throughout the project.
- **Budget:** \$ 28,800
  - APFNet: \$ 9600 for labor-patrol works (48months× \$ 5/person-day×4 persons/patrol× 10 patrols/month)
  - Community: \$ 19200 for labor-patrol works (48months× \$ 10/ person-day

× 4 persons×10days

## Output 3 A FA Triage nursery improved

### Significance

To encourage reforestation in Cambodia, FA offices/stations at all levels, from national, provincial, district, to triage, run nurseries to raise and provide seedlings to the public freely. These nurseries are not operated very well because of lack of demands at present. This project, with the primary goal to facilitate the CF management, aims to revitalize FA Triage nursery, which is near to the project site. While avoiding the disadvantage of building a new nursery in the community, such design can use fully the existing facilities, and set a model for other areas to strengthen FA Triage nurseries and CF management at the same time.

### Basic information

FA Triage nursery is located at about 40 km from the project site, but which is the nearest one capable technically to produce seedlings. The triage nursery is small, with an area of about 300 m<sup>2</sup> and its facilities need to be updated. There are 2 technicians working in the Triage FA and responsible for the seedling production.

### Methodology

The seedling production capacity of FA Triage nursery is enhanced through expanding the production areas, updating facilities, and hiring more seedling maintenance workers, so as to satisfy the project's seedling demands on arbor/timber trees and fruit trees.

### Activity 3.1 Improve Triage nursery facilities

- **Description:** The project will enhance the FA Triage nursery since the number of seedlings produced annually is constrained by its budget and the nursery capacity. Improvements include expansion of production areas and update of facilities.
- **Participants/Responsible Person:** FA Triage office.
- **Timeframe:** The improvement activity will be conducted as soon as the project is approved.
- **Budget:** \$ 10,200
  - APFNet: Nursery improvement (contract/packaged): \$ 7000; travel expense: \$ 3200 ( \$ 80/day ×2persons ×20days)

### Activity 3.2 Raise seedlings in the nursery

- **Description:** To satisfy the project's demands of seedlings of both timber trees and fruit trees, the FA Triage nursery is expected to boost its seedling production based on enhanced capacity.
- **Species of seedlings:** According to the restoration design, the nursery will produce seedlings of *Pterocarpus macrocarpus*, *Dalbergia cochinchinensis*, *Dalbergia oliveri*, *Tectona grandis*, and *Cassia siamea*. In addition, the production may also

cover asexually propagated fruit tree seedlings, such as *Macadamia ternifolia* (macadamia nut), *Litchi chinensis*, and *Zizyphus mauritiana* (green date), etc.

- **Source of propagation materials (seeds, seedlings):** (1) purchase from local markets, (2) collect from natural forests by project staffs, for instance, the seeds of *Cassia siamea* will be collected in March to April, and sowed soon after collected, and (3) import from China.
- **Production and maintenance:** Seedlings produced in the nursery are container seedlings. The container is nonwoven nutrient bag. The ground total to be produced is about 15,000 seedlings. Production materials (fertilizers, pesticides, and nutrient bags) and production labors will be paid by the project. Necessary maintenance labors in the forthcoming years will also be paid by the project. Seed treatment and seedling production will be carried out according to the biological characteristics of the species. For instance, the seeds of *Cassia siamea* will be soaked in hot water with the temperature of 60-70°C. When water cools down the seeds will be soaked with tap water for 1-3 days. After sowing in strips, the seed bed is covered straws to keep moisture. Seedlings are transplanted into nutrient bags 1-2 weeks after germinated.
- **Timeframe:** The production of seedlings will start in the first year. The maintenance of the nursery will last until the third year.
- **Budget:** \$ 52,500
  - APFNet: \$ 45750 for seedlings( \$ 1.5/seedling×30500seedlings: seedlings for Deforested Area (Open area): 6,000 plants; seedlings for Severely Degraded Forest: 20,000 plants; seedlings for Moderately Degraded Forest: 2,500 plants seedlings for Dense Forest: 2000 plants ); travel expense: \$ 1600 ( \$ 80/day× 2persons×10days), International consultancy \$ 5150: International Travel: \$ 2000 ( \$ 1000/person ×2persons); Food and lodging: \$ 3150 ( \$ 225×7 days× 2persons)

## Output 4 Restoration and silviculture models established

### Significance

Community forests, though expected to play important roles in both ecological maintenance in Lancang-Mekong watershed and product provisions for local communities, are degraded at different extent due to historical reasons such as shifts of tenure, unclear responsible parties and unordered uses. To achieve the sustainable CF management, it is necessary and urgent to test and develop replicable technologies of reforestation and silviculture. This project aims to develop specific models and relevant technologies for each type of degraded forests. A different technique will serve as a model to those who wish to implement reforestation in a certain type of degraded forest. All 4 models of reforestation give an integrated technical guidance for CF management in the region.

### Basic information

The CF of Dokpor Village are tropical dry forests comprising of deciduous and evergreen tree species, such as *Dipterocarpus obtusifolius*, *Pterocarpus macrocarpus*, *Phyllanthus*

*emblica*, *Antidesma ghaesembilla* in the tree/top layer, *Melienthes suavis*, *Diospyros ebretoides*, *Mesua ferrea*, *Memecylon edule*, *Catunaregam tomentosa* in the shrub layer, and *Curcuma alismatifolia*, *Scoparia dulcis*, *Ludwigia adscendens*, *Costos speciosus*, *Morinda tomentosa* in the herbaceous layer. Due to intensified harvesting during/after the civil war, reclaiming land for rice production by destroying forests, continuously cutting of big trees in normal times, and interrupted grazing, the community forest is degraded. There are some regenerated seedlings in the forest, but a big proportion of them are root suckers genetically deteriorated.

## Methodology

To recover ecological functions and forestland productivity of community forest, it is suggested by consultants that forests need to be classified into different grades of degradation at first, and then species composition and stand structure need to be adjusted through reforestation and silviculture treatments. Based on plant community appearances and internal species compositions, the CF is classified into 4 grades, i.e., Deforested areas, Severely Degraded forest, Moderately Degraded forest, and Dense Forest. The project will, based on such classification, develop restoration and silviculture models by using different tree species and technologies. A trial of 16 hectares will be developed for reforestation demonstration. Each treatment will cover 4 hectares, in which about 1000 m<sup>2</sup> are remained as a control.

## Activity 4.1 Design and prepare soil for 3 types of degraded forestlands

- **Description:** In the community forests, three types of degraded forestlands, i.e., Deforested Area, Severely Degraded Forest, and Moderately Degraded Forest are chosen and blocked to build restoration models. The area of each type is 4 hectors, and the total area for restoration is 12 hectors. Relevant techniques will be tested and developed corresponding to current conditions of each type of degraded forestlands.
- **Restoration Design:** The contents of restoration design include tree species to be used, existing plants to be remained, soil preparation method, planting density/spacing, planting method and time, and maintenance requirements, etc.. The design will be carried out in the field block by block, while referring to advices given by international consultants and plot data of forest investigation.
  1. Restoration of **Deforested Area:** In this area, the project will plant with precious timber plantation using tree species of *Pterocarpus macrocarpus*, *Dalbergia cochinchinensis*, *Dalbergia oliveri*, and *Tectona grandis*. Each tree species is planted with a total area of 1 hectare, in total of 4 hectares or 4 blocks. Planting density for above tree species is 2×3 m, 3×3 m, 3×3 m, and 3×4 m, respectively. That means seedlings of each tree species required is 1,667 seedlings of *Pterocarpus macrocarpus*, 1,111 seedlings of *Dalbergia cochinchinensis*, 1,111 seedlings of *Dalbergia oliveri*, and 833 seedlings of *Tectona grandis*. Though a total of 4,722 seedlings are required in the deforested area, a ground total of 6,000 seedlings will be

produced considering the allowance for mortality. The site preparation will involve clear cutting of the sites to be planted. After removal of small trees, shrubs and weeds, the land will be prepared with pit holes with a size of 50×50×40 cm.

2. Restoration of **Severely Degraded Forest**: Firewood plantations will be practiced in Severely Degraded Forest using tree species of *Cassia siamea*. For original forest, dominant trees with straight trunks in the tree layer will be remained, while small trees, shrubs and weeds under remnant trees are cleared out. The size of pit for planting is 40×40×30 cm. The density for planting is 1×2 m, which means a total of 20,000 seedlings or 5,000 seedlings per hectare or per block. (i.e. at 5,000 seedlings/Ha.) required. Each pit is applied with 50 g of compound fertilizer. A technical manual for firewood plantation management in the CF will also be produced at the end of the project. Field planting will be carried using 1-year-old seedlings.
  3. Restoration of **Moderately Degraded Forest**: For the site preparation, vigorous precious trees with straight trunks will be maintained while untargeted trees will be cleared out in the moderately degraded forest. The management of moderately degraded sites will involve multistory management using pepper and other rosewood tree species such as *Pterocarpus macrocarpus* and *Dalbergia cochinchinensis*. Black peppers will be planted in cluster under the forest, with a density of 200-300 clusters per ha, and 3-5 seedlings per cluster. The seedlings of premium timber (*Dalbergia* and *Pterocarpus*) will be planted at 4m x 4m. This will require a total of 2,500 rosewood seedlings (at 625 seedlings/Ha.), while a total of 1,500 black pepper seedlings will be required (at 5 seedlings per cluster and 300 clusters/Ha.).
- **Soil Preparation**: Based on the restoration design, site clearance and soil preparation will be carried out in each type of targeted forestlands in a specific standard and requirement.
  - **Other Preparations**: Due to the conditions of the project site, it is suggested that two water tanks, water pipes, pumpers, a small simple tool house, and some working tools are necessary to be prepared.
  - **Responsible Party**: The restoration design will be handled by IRD project staffs with the assistance from the community. Soil preparation will be organized by the community, with the technical guidance from project staffs, and other preparations will be handled by the CF management team with the assistances from village chief and other villagers.
  - **Timeframe**: The restoration design will be carried out at the beginning of the project. Soil preparation will be implemented at the dry season before planting. And the other preparation, in particular the water tank building will also be finished as early as possible, so as to impound water as much as possible.
  - **Budget**: \$ 25,470
    - APFNet \$ 24,470 : Site preparation: \$ 12000 ( \$ 1000/ha×12ha); Labor:

- \$ 3000: \$ 10/person-day×10persons×30days; travel expense: \$ 4320 ( \$ 80/day × 3persons×18days).International consultancy \$ 5150: International travel: \$ 2000 ( \$ 1000/person×2persons); Food and lodging: \$ 3150 ( \$ 225×7 days× 2persons)
- ❑ Community \$ 1000 for labor: \$ 10 /person-day ×10persons×10days.

## Activity 4.2 Plant and maintain restored forests

- **Description:** Seedling planting and sapling maintenance are crucial to establish restoration models, so as to guarantee the success of the project. The activity will go through backfilling of soil, application of fertilizers, planting of seedlings, first watering during the planting, and maintenances of plantations.
- **Planting Requirements:** (1) Seedlings for planting should keep in an even size and go beyond at least 1 year old; (2) Seedlings of each species are accurately allocated and properly planted in a specific block and row or column according to the design; (3) Seedlings are transported and planted in the nonwoven nutrient bags; (4) basal compound fertilizers are applied according to the design for each tree species and each blocks.
- **Maintenance requirements:** (1) After planting, the plantations will be maintained by conducting periodic weeding to free the planted seedlings from competing weeds and vines that will suppress the newly planted seedlings; (2) The plantations will be watered regularly depending on different requirements of tree species; (3) The maintenance should also take care of irrigation facilities and other working tools.
- **Timeframe:** The planting will be carried out at the first year of the project after the completion of the activity 4.1. The maintenance will be started right after the planting, and will last for at least 3 years.
- **Budget:** \$ 12,240
  - ❑ APFNet: \$ 11,240 supplies and material(fertilizer, tool, pesticides): \$ 3840 ( \$ 480/ha×8ha); \$ 1000 for labor: \$ 10/person-day×10persons×10days; travel expense: \$ 6400 ( \$ 80/day × 4persons×20days)
  - ❑ Community: Labor: \$ 1000: \$ 10/person-day×10persons×10days

## Activity 4.3 Clear, plant and tend in dense forest

- **Description:** A forest ecosystem management will be applied through tending, thinning and enrichment. The management of forest ecosystem in Dense Forest is mainly about tending, thinning and enrichment planting, so as to speed up the succession progress of forest community and exert its due functions.
- **Technical Parameters:** (1) Thinning the overly crowded or clustered trees, such as *Dipterocarpus*, rosewood tree species, etc., so as to keep the spacing in 2×3m; (2) Tending on the root sprouted suckers of *Dipterocarpus* species, through which each cluster will be kept with a top edge and the strongest sprout seedling; (3) Enrichment planting in forest gap with an area more than 15 m<sup>2</sup>, using tree species such as *Pterocarpus macrocarpus*, *Dalbergia cochinchinensis*, and *Dipterocarpus* species. The planting density is 2×3 m; (4) Tending on naturally

regenerated rosewood saplings such as *Pterocarpus macrocarpus* and *Dalbergia cochinchinensis*, through clearance of surrounding shrubs and application of 100 g of compound fertilizer for each sapling. The estimated number required is 2,000 seedlings (at 500 seedlings/Ha.).

- **Area Covered:** This treatment will cover 4 hectares.
- **Responsible Person:** The activity will be conducted by the CF members with the assistances of the project staffs.
- **Timeframe:** This activity will be conducted during the project implementation. Thereafter, the project will monitor the response of the forest community.
- **Budget:** \$ 12,400
  - ❑ APFNet: \$ 11,400. Supplies and material (fertilizer, tool, pesticides): \$ 4000 ( \$ 1000/ha ×4ha); labor: \$ 1000: \$ 10/person-day ×10persons ×10days; travel expense: \$ 6400 ( \$ 80/day × 4persons×20days)
  - ❑ Community: Labor: \$ 1000: \$ 10/person-day×10persons×10days

## Output 5 Village water supply system established

### Significance

Water is the limiting factor for many years in the project sites. Some of the households need to purchase water from a delivery truck for domestic needs. On one hand, the activities to be carried out in the village, i.e., agroforestry and homegarden farming systems, are highly depending on water availability. On the other hand, when dealing with the problems of community forest management, difficulties of the community in particular the basic living conditions (such as domestic water) have to be fully considered, so as to obtain villagers' supports and guarantee the success of the project.

### Basic information

There is no tap water in Dokpor Village. Domestic water is stored raining water and unstrained water from shallow well in the yard. This will affect the health of people and impact living conditions of the villagers. There has no a water pond in the village until the government helped the village to dig a 50m×50m×4m water pond outside the village in 2016. Villagers are supposed to carry water from the pond from more than 2 km away. So, the water supply is the most concerned issue in the village.

### Methodology

Based on the water pond fundamentally built by the local government, the project will assist the village to complete the construction of water supply system. The construction of water supply system will be input by both the households in the village and the project. After completion of construction, the water supply system will be maintained by the village. The construction includes stabilizing the pond dike (four sides), installing solar pumping facilities, and laying out main water pipe from the pond to the village. The branch pipes going into households will be constructed by each household.

### Activity 5.1 Stabilize pond dike and install pumping facilities

- **Description:** The pond will be enhanced by stabilizing the dike using creepers or grasses and trees. Moreover, the water pond will be installed with a tank (5,000-liter capacity), a tower, a water filter unit, a solar pumping system and small house to keep the facilities (such as pumping engines).
- **Technical requirements:** At the water entrance, the northeast corner of the pond, a sinking tank with a size of  $3\text{m} \times 3\text{m} \times 2\text{m}$  will be built to decrease the contents of sands and litters. The pond is a square with a side length of 50 m and the depth of 4 m. The stabilization of the pond dike includes building a cement ditch at inner sides and greening outside banks surrounding the pond. The ditch will go through all four sides with 50 cm width and 40 cm depth. The green belts are 13 m wide and 200 m long, in total covering an area of 2600 m<sup>2</sup>. The greening will be implemented using creepers or grasses and trees. At the southwest corner, a pumping system including water tank, filter unit, solar pumper, and a small house to store facilities will be installed.
- **Responsible Party:** The activity will be conducted by contractors for separated contents, such as the construction of ditch, tow tanks, tower and facility house, the greening of banks. In addition, the solar pumping system will be installed by the suppliers directly.
- **Timeframe:** This activity will be conducted in the first year.
- **Budget:** \$ 22,000
  - ❑ APFNet: \$ 19,000. Design cost: \$ 1000; construction supplies and material: \$ 6000; solar pump system: \$ 7000; water tank: \$ 5000
  - ❑ Community: \$ 3,000 for labor : \$ 15person/day $\times$ 20 persons  $\times$ 10 days

### Activity 5.2 Lay out main water pipe from the pond to the village

- **Description:** The main water pipeline will go through from the water tower to the aggregated residences, which means that a ground total of 2 km main pipeline are required. From the main water pipe, the households will connect to their individual residences.
- **Requirements:** Steel pipe with a 50 cm diameter is required for the main water pipeline. The layout of main pipeline will be kept in a shortest distance and to run through most aggregated residences.
- **Responsible Parties:** This activity will be implemented by the community, with technical assistances of water supply companies or relevant technicians.
- **Timeframe:** This activity will be conducted in the first year.
- **Budget:** \$ 27,200
  - ❑ APFNet: \$ 20,200. Main water pipe: \$ 5/m $\times$ 2000m = \$ 10000; water distribution sytem: \$ 2000; supplement: \$ 5000; travel expense: \$ 3200 (\$ 80/day  $\times$  4persons $\times$ 10days)
  - ❑ Community: \$ 7,000 for maintenance: \$ 4000( \$ 1000/year $\times$ 4 years), \$ 3000 for labor : \$ 15person/day $\times$ 20 persons  $\times$ 10 days



## Output 6 Agroforestry farming system established

### Significance

To address problems inside the CF, it is necessary to consider agriculture and agroforestry issues outside or surrounding the CF. Through introduction of sustainable agriculture and agroforestry, a portion of the farms will be developed for multistory cropping. Macadamia, green date, or mango will be planted, and their underneath will be interplanted with vegetables and other cash crops. The project will put up a demonstration for agroforestry models, to strengthen the productivity of degraded lands and generate more cash incomes for farmers.

### Basic information

The site selected for establishing and demonstrating the agroforestry model is located at the edge of community forests, which was claimed by farmer for rise plantation in the past. The area of the site chosen is about 1 ha. The owner of the land is not interested in continuing rise plantation anymore since he became a manager of community forests, and willing to try agroforestry plantations.

### Methodology

Based on the willingness of the land owner, the project is going to establish an agroforestry model by intercropping of high-value cash tree species such as macadamia trees with vegetables. The model will generate cash incomes for the farmer since the first year to plant vegetables. The model is hopefully extended to other households in the village or even to the other villages through demonstration of intercropping technologies.

### Activity 6.1 Prepare soil, irrigation facilities and seedlings (including import)

- **Description:** This activity is to settle the site for establishing agroforestry demonstration. A detailed design will be carried out by the project staffs with the technical supports from international consultants, so as to decide tree species and intercropping patterns. At the same time, seedlings are imported from China during the preparation period.
- **Technical Requirements:** Soil preparation will be carried out according to the design strictly, so as to reserve appropriate spaces for specific intercropping species. The planting spacing of Macadamia is 4m×5m, which means 167 seedlings are required. Mango tree, if selected, will be kept a planting spacing of 5×4 m. Vegetables or agricultural crops will be planted in the row intervals at the early stages.
- **Responsible Parties:** The project will provide the farmer irrigation facilities, seedlings and some compound fertilizers, while soil preparation, the layout of irrigation pipelines will be carried out by the farmer. International consultants will help import the seedlings of Macadamia and/or green date. The project staffs will guide the preparation and seedling transferring, etc.. Seedlings

imported may be maintained in FA Triage nursery for a few days/months before planting.

- **Timeframe:** This activity will be conducted in the first half year after the project is approved.
- **Budget:** \$ 15,053
  - ❑ APFNet: \$ 14,853. Land preparation: \$ 1903 ( $12.69\text{cum.Ha} \times \$ 150/\text{Ha}$ ); irrigation facilities: \$ 2000; seedlings: \$ 1800; travel expense: \$ 4000 ( $\$ 80/\text{day} \times 5 \text{ persons} \times 10\text{days}$ ). International consultancy: \$ 5150, international travel: \$ 2000 ( $\$ 1000/\text{person} \times 2\text{persons}$ ); food and lodging: \$ 3150 ( $\$ 225 \times 7 \text{ days} \times 2\text{person}$ )
  - ❑ Community: \$ 200 for labor ( $\$ 10/\text{day} \times 2\text{person} \times 10\text{days}$ ).

## Activity 6.2 Plant and maintain cash trees and vegetables

- **Description:** This activity will involve establishment and maintenance of the demonstration of agroforestry (1 ha). The following crops will be planted: (1) *Macadamia ternifolia* (macadamia nut); (2) *Mangifera indica* (mango), or (3) *Zizyphus mauritiana* (green date) and vegetables that are identified during the farm planning. Plantations are required properly maintained by the farmer after planting.
- **Technical Requirements:** (1) Basal manure or compound fertilizers will be applied during the soil backfilling into pits; (2) Seedlings of different species are planted in correct positions according to the design; (3) Planted seedlings have to be watered as soon as planting is finished; (4) Vegetables can be planted in the interval of tree row according to the season for vegetable production.
- **Responsible Parties:** The maintenance of agroforestry plantations will be handled by the farmer. Some replanting seedlings, fertilizers and pesticides will be provided by the project.
- **Timeframe:** This activity will be conducted after the completion of activity 6.1.
- **Budget:** \$ 4,030
  - ❑ APFNet: \$ 3,630 supplies and materials (fertilizers, pesticides, tools, etc) : \$ 750 ; travel expense \$ 2880 ( $\$ 80/\text{day} \times 4 \text{ persons} \times 9\text{days}$ )
  - ❑ Community: \$ 400 for labor ( $\$ 10/\text{day} \times 4\text{person} \times 10\text{days}$ )

## Output 7 Homegarden farming system established

### Significance

The project aims to develop a model for full use of the yard, which is named homegarden here. In homegarden, a demonstration of the utilization underneath the forest stands for the production of shade tolerant crops that could support the immediate income of the farmer before the final harvest. By demonstrating the possible production of crops underneath the forest canopy, the farmers who have existing forest will conserve the forest as a long-term crop rather than clearing them. At the same time, a demonstration of cash tree plantation will be established, also aiming to generate more cash income sources for local farmers.

## Basic information

The yard of each household is comprised of two parts. One is open area and another is degraded secondary forest. At most occasions, farmers' yards are kept with just it is. Neither economic income nor ornamental effect provides to the owner. Based on the current conditions of farmers' yards, it is necessary to set a model to showcase the functions of their yards. The yard of selected household for demonstration covers approximately 1.7 hectares.

## Methodology

In the farmer's yard, three activities are going to be implemented: (1) establishing multistory management model in woodlot (i.e., degraded secondary forest); (2) establishing intensively management cash tree plantation in open area of the yard; (3) building water system in the yard, which may include water tank, irrigation pipes, etc. This model of homegarden management is expected to be gradually extended to other households through demonstration and availability of tap water in the village.

### Activity 7.1 Prepare soil, irrigation facilities and seedlings

- **Description:** A small simple design for the homegarden farming system will be carried out before implementation. The woodlot of the farmer will be developed by conducting some thinning and intercropping with black pepper. The open area of the yard will be established with Lemon plantations. Irrigation facilities include a water tank, a set of pipelines. The seedling preparation includes purchase of lemon and pepper seedlings.
- **Technical Requirements:** (1) In woodlot, the shrubs and trees that have no commercial value will be cleared for the planting of peppers, while five tree species, i.e., *Xylia xylocarpa*, *Pterocarpus macrocarpus*, *Shorea roxbourghii*, *Ochna integerrima*, and *Sindora siamensis* will be remained if their DBH go beyond 3 cm; (2) Peppers are going to be planted after thinning, with a density of 200-300 clusters per ha and 3-5 seedlings per cluster (a total of 1,050 seedlings); (3) Soil preparation for pepper is required to dig deep ditches, while pits for lemon plantation is 30cm×30cm×30cm. (4) A small plot (approximately 1,000 sq.) will be kept to serve as control. (5) The size of water tank is 3m×3m×2m.
- **Responsible Parties:** The activity will be done basically by the farmer cooperator. Some of the activities will be subsidized by the project. The Project Staff will provide technical assistance to the farmer in developing of his land.
- **Timeframe:** The establishment of homegarden farming system will be started as the project is approved, and completed in the middle of the second year.
- **Budget:** \$ 7,603
  - ❑ APFNet: \$ 6,303. Land preparation: \$ 1903 (12.69cum.Ha × \$ 150 /Ha); irrigation facilities: \$ 1000; seedlings: \$ 1800; travel expense \$ 1600( \$ 80/day×2 persons× 10days)
  - ❑ Community: \$ 1,300. labor for woodlot development \$ 700 ( \$ 10/day × 3person × 35days); Labor for tank construction: \$ 600

## Activity 7.2 Plant and maintain cash trees and peppers

- **Description:** Planting is carried out on the basis of the design and preparations. In homegarden farming system seedlings to be planted are lemon trees, black pepper, while maintenance will cover irrigation facilities besides the plantations.
- **Technical Requirements:** (1) Before planting, backfilling of soil is required, which will be accompanied with basal manure or fertilizer application; (2) Planted seedlings have to be watered as soon as planting is finished; (3) For the maintenance of pepper seedlings planted, shades may be necessary by using either fresh tree branches or plastic shading nets; (4) Regular irrigation is important for keeping high survival rate, in particular during the beginning stages.
- **Responsible Parties:** The maintenance of plantations will be handled by the farmer. Some replanting seedlings, fertilizers and pesticides will be provided by the project.
- **Timeframe.** Planting will be carried out in the first raining season after the preparation is completed. Maintenance will last for 3 years after the establishment of plantations.
- **Budget:** \$ 9,000.
  - ❑ APFNet: \$ 6,800. supplies and materials (fertilizers, pesticides, tools, etc) : \$ 2000 ; travel expense \$ 4800( \$ 80/day×4 persons × 15days)
  - ❑ Community: \$ 1200 for labor( \$ 10/day×3person-day×10day/year×4 years)

## Output 8 Forest watcher system and auxiliary facilities installed and maintained

### Significance

State-owned forests account for a much bigger proportion of Cambodian forests. These forests, however, are threatened by forest fires, land encroachment, illegal cutting and hunting, etc. The technology of forest watcher provides a continuous monitoring and surveillance of the surroundings. The project, therefore, will introduce the forest watcher as an advanced monitoring system to strengthen the conservation of state-owned forests.

### Basic information

The Forest Watchers will be implemented in the research station in Khun Ream and Tamao Zoo Forests. The Khun Ream research station is subordinated to the Institute of Forest and Wildlife Research and Development, while the Tamao Zoo Forest is under the management of the Tamao Wildlife Rescue Center of the Forestry Administration. In Khun Ream, forests to be monitored are comprised of 1,888 ha of seed source areas, 180 ha of newly planted area, and 15 ha of seed orchard. Forest to be watched in Tamao Zoo Forest covers a total area of 2285 ha, playing an important role in rescuing and rehabilitating the wildlife of Cambodia. There are 5 permanent staff and workers plus 20 security guards for protection of seed source area in Khun Ream

Forest Research Station. There are 12 permanent staff and 51 seasonal staff and security guards in the management institution of Tamao Zoo Forest.

### **Methodology**

The installation of the forest watcher will start with the construction of auxiliary facilities such as site selection and infrastructure construction. The engineers from the Watcher supplier will assist the Project Management Team in the planning of introduction and installation of the forest Watcher. The engineers from the supplier, with the assistance of domestic consultants, will help in preparing reports, particularly on the interpretation and analysis of the images captured by the forest Watcher. To obtain ideal monitoring effects, consultants, supplier engineers, project staffs and local technicians should cooperate closely.

To guarantee that the quality and time of forest watcher system construction, APFNet will bring the executive agency (IRD) and the Watcher supplier together once after the project is approved, to sign a bilateral or tripartite indenture. In the indenture, it will be entrusted that expenses of the forest watcher system construction are paid by APFNet to the supplier directly.

### **Activity 8.1 Survey, design and construct auxiliary facilities**

- **Description:** The activity includes reconnaissance/site selection; preparation of detailed engineering design; purchase and delivery of construction materials; site layout and construction of towers; construction of the operation room/building; layout of cables.
- **Technical Requirements:** (1) reconnaissance, engineering design, and construction will follow strictly relevant Cambodian construction standards or technical regulations. If there is no relevant standard, construction will refer to the Chinese standards.
- **Responsible Parties:** Technical requirements will be guided by Engineers from the equipment suppliers. The infrastructure construction will be handled by the Project team and implemented by contractors. Local personnel from research station and zoo forest will be fully involved in the whole process.
- **Timeframe:** Site selection and engineering design will be finished in the first half year of the project. Auxiliary facilities construction will be finished at the end of the first year.
- **Budget:** \$ 647,150
  - ❑ APFNet: cost of forest watcher system: \$ 636,850; International consultancy \$ 5150; International Travel: \$ 2000 ( \$ 1000/person ×2persons); Food and lodging: \$ 3150 ( \$ 225×7 days× 2person);
  - ❑ To be paid by APFNet to the supplier directly.

### **Activity 8.2 Deliver and install forest watcher system**

- **Description:** The activity includes purchasing, delivering, installing two sets of the forest watcher systems. This process may include signing purchases and sales contract, processing export and import documents, transporting facilities, and



installation of the watcher system.

- **Requirements:** (1) The supplier and the project team should cooperate very closely to work on the deal; (2) Two sides should strictly follow the import and export regulations of both country; (3) The supplier should consider the project and Cambodian project team as a very important customer, and responsible for technical issues.
- **Responsible Parties:** The supplier is responsible for export documents, international transportation, and technical issues. The project will responsible for import documents, local transportations, and other necessary operations in Cambodia.
- **Timeframe:** The forest watcher system will be completely installed at the end of second year since the project starts.
- **Budget:** \$ 220,000
  - ❑ APFNet: Construction of system: \$ 220,000;
  - ❑ To be paid by APFNet to the supplier directly.

### Activity 8.3 Test system, train personnel, and process data/images

- **Description:** Images generated from the forest watcher will be collated and analyzed with the assistance of international consultants and supplier's engineers. staffs in two sites will be assigned and trained to operate the systems.
- **Rationale of the Activity:** The data generated by the Forest Watcher will give on-time information on the forest dynamics and assist in reconstructing the trend of the forest cover.
- **Detailed Implementation Approach:** The operation of the forest watcher involves mainly the collection and processing of data/images.
- **Budget:** \$ 40,800
  - ❑ APFNet: Reserve cost: \$ 40,800;
  - ❑ To be paid by APFNet to the supplier directly.

### Activity 8.4 Maintain and repair the watcher system

- **Description:** The Forest Watcher system will be maintained and repaired in case there is a need, so as to guarantee the daily operation and uninterruptedly monitoring.
- **Requirements:** All equipments and associated facilities will be maintained and repaired according to the conditions and periods of product warranty. But for this project, the Forest Watcher will be maintained and repaired in the whole project period (4 years). During the project period, it will be regularly maintained and the repairs will be conducted whenever necessary.
- **Responsible parties:** Under the conditions and periods of product warranty, the supply company will be responsible for the maintenances and repairs of the forest watcher system and responsible for training local technicians with maintaining and repairing techniques. After the project implementation (4 years), these responsibilities will be transferred to local technicians.
- **Implementation:** The supplier's engineers will regularly visit and check the

operation of the Forest Watchers. At least a staff will be assigned to get trained on technology of maintenance and repair of the unit.

- **Timeframe:** Maintenance and repair will start as the watcher system is tested and put into operation, and will last at least four years.
- **Budget:** \$ 9,600
  - FA: normal maintenance: \$ 9600 ( \$ 200 person-month  $\times$  12months  $\times$  4 persons )

## **Output 9 An integrated forest management technology assembled and a technical handbook formulated**

### **Significance**

The nature of the project is to develop and demonstrate models and technologies related to integrated CF management and forest watcher systems. Though the CF and state-owned forests selected are focuses during the implementation, a series of technologies will be summarized, compiled and documented at the end of the project. These technologies are expected to guide CF management in other communities and pilot the watcher applications in other areas. Aggregation of technologies is, therefore, significant for the goal of project to achieve integrated forest ecosystem management in Cambodia and GMS.

### **Methodology**

To obtain technical documents, first, the implementation should be recorded and documented in the process from design to completion report of each activity. Secondly, baseline investigation, midterm and final evaluations of the project should take the techniques adopted into account. Thirdly, participatory approaches will dominate in the technology assembling and handbook formulation.

## **Activity 9.1 Summarize technologies of integrated CF management and experiences of watcher construction**

- **Description:** Based on activities carried out and outputs obtained, relevant technologies are going to be summarized. These technologies cover restoration of degraded CF, establishment of agroforestry and homegarden farming systems, as well as the experiences of constructing and installing forest watcher system.
- **Approaches:** The process to summarize technologies may go through document review, field survey and group meetings or workshops. To ease the work of summarization, it is strongly suggested that all information/data from design, implementation records, to monitoring and evaluation, should be collected, collated, and archived. At the end, group meetings or workshops will be held to fix different sets of technologies. For the watcher system, experiences and lessons learnt from construction and installation should be included in the completion reports.

- **Participants:** In principle, all stakeholders and persons involved in the project implementation should take part in the technology summarization process. Project staffs in IRD, however, will be the major player in this process. Moreover, some external experts/consultants can be invited if necessary.
- **Timeframe:** This activity will be carried out in the middle of the last year of the project implementation.
- **Budget:** \$ 2,700
  - ❑ APFNet: material and writing cost: \$ 2,700

## Activity 9.2 Formulate technical handbooks for integrated CF

### management and for the watcher operation

- **Description:** Based on the technologies summarized, handbooks for integrated CF management and for the forest watcher system operation will be formulated and published or distributed, so as to make technical extension easier.
- **Technical requirements:** (1) Two versions of technical handbooks or manuals are required. One is in Cambodian and another is in English. (2) Technical handbook for integrated CF management will cover horizontally but not limit to demarcation, patrolling, restoration, silviculture, agroforestry, homegarden. (3) Each technology for CF management will cover vertically but not limit to design (such as species placement), preparation, planting, maintenance and monitoring. (4) A technical manual or operational handbook will be prepared for the forest watcher system.
- **Responsible parties:** The formulation of technical manuals and handbooks will be mainly conducted by the project team. If necessary, international constants may help to configure the framework of the handbooks. Operational handbook for the forest watcher, however, will be prepared through the cooperation between technicians of supplier and local technicians who are assigned to handle the watcher.
- **Timeframe:** Technical handbooks or manuals will be completed within 1 months before the project completion.
- **Budget:** \$ 9,500
  - ❑ APFNet: \$ 9,500. Writing cost: \$ 2000; published and distributed: \$ 7500 (\$ 15/ copy×500 copies)

## Output 10 Experience and technology demonstrated and disseminated

### Significance

As a pilot project in specific spots, it is impossible to improve CF management and the conservation of state-owned forests in whole Cambodia and GMS. That indicates that technical extension and relevant policy recommendation are necessary. In other words, the roles of the project in rehabilitating ecological services and product provisions of forests in Mekong watershed can be amplified only through technical

extension and dissemination.

## Methodology

The targets to disseminate technologies achieved from the project are classified primarily into three groups, i.e., forestry authorities (national FA), forestry practitioners (mainly local FA and famers), and foresters in other economic entities of the Great Mekong Sub-regions. As the target groups vary, methods to share experiences and disseminate technologies differentiate. For national FA, a policy recommendation will be submitted based on experiences summarized and effects achieved. For local practitioners, technologies will be demonstrated through organizing field visit, while technical handbooks will be distributed during the field visits. For the foresters in other economic entities, experiences and technologies will be shared and extended through publication and distribution of books, participation in international conferences and forums.

### Activity 10.1 Organize workshops and field visits of domestic foresters

- **Description:** The project will hold regular workshops to share experiences of the project. Information and education materials will be produced and will be distributed during the gatherings. At the end of the project, a workshop will be conducted to present the outcome of the project. When the demonstrations of integrated CF management and forest watcher are established, local forestry practitioners will be organized to visit the project sites. The field visits are: (1) to give visitors a visualized effects of integrated CF management and forest watcher system; (2) to interpret directly the implementation procedures of establishing models; (3) to raising awareness of forest conservation and sustainable management.
- **Requirements:** (1) There are at least 2 workshops to be held during the project implementation, of which one is midterm workshop and another is completion workshop. (2) Participants of the field visit can be differentiated into two groups. One group is responsible for state forest management, and another is responsible for forest management in rural areas. (3) The field visits can also be separated into two trips. One goes to the north for forest watcher system, and another goes to Dokpor village for CF management. (4) The number of the participants in each field visit group averagely will not go beyond 50 persons, while that of workshops will not go beyond 30 persons.
- **Responsible parties:** The organizer of the workshops and field visits is the project team in IRD, while the reception of scattered and individual visitors in the field will be handled by the community in the project site or the management institutions of the watcher sites.
- **Participants:** The workshops will involve forestry institutions and NGOs in Phnom Penh, CF Management Committees, local FA, and other agencies playing important roles in the management of the watershed. Participants of the filed visits will include local FA officers and staffs, villager chiefs and CF chiefs,

voluntary villagers and other potential parties.

- **Timeframe:** The field visits and workshop will be organized at the second and third year of project implementation, so as to guarantee that visitors can see the effects of the project.
- **Budget:** \$ 9,700
  - APFNet: (1)Workshops: \$ 3,000: (meeting room: \$ 300 (\$ 150/time×2 times), transportation: \$ 600 (\$ 10/person-time × 30 person-time × 2 workshops), Accommodation and food: \$ 2100 (\$ 35/person-time × 30 person-time× 2 workshops); (2) Field visits \$ 6,700: Bus rental: \$ 1200 (\$ 300/day × 2days × 2 trips), Accommodation and food: \$ 3500 (\$ 35/day×50 person ×1 days ×2 trips), Allowance for participants: \$ 2000 (\$ 10/person-day×50 persons × 2 days × 2 trips).

## Activity 10.2 Publish a book of Community Forestry Development in Cambodia

- **Description:** Since CF is an inevitable component of Cambodian forestry, a book primarily named *Community Forestry Development in Cambodia* is to be published. The book will contain the brief history, current conditions, relevant policies, advanced progresses and study cases of community forestry in Cambodia. Through publishing such a book, the readers (decision-makers, FAs in different levels, international stakeholders and potential financing institutions) will obtain a whole picture of CF in Cambodia, so as to seek intervening opportunities.
- **Requirements:** (1) The book is to be published in English. (2) The number is about 1000 books. (3) The book is to be formally published with an ISBN.
- **Responsible parties:** The book will be published based on close cooperation between IRD and Yunnan Academy of Forestry (YAF), China. IRD will be responsible for data collection and drafting, of which data to be collected includes historical information, statistic data, field survey and case studies, etc. YAF will be responsible for book outlining, editing, proofing, and publishing etc.
- **Timeframe:** In the second year of the project general information collection and outline formulation will be carried out as well as field survey and case studies, as well as supplementary data collection, will be carried out. In the third year drafting the book is a focus. In the fourth year the book will be published after editing, printing, and publishing.
- **Budget:** \$ 24,000
  - APFNet: \$ 24,000 Publishing expenses of 2000 copies: \$ 15000, writing cost:&6000, data collection and survey: \$ 3000

## Activity 10.3 Draft and submit a policy recommendation of CF management to FA

- **Description:** The effects of integrated CF management practiced in Dokpor



village will be comprehensively evaluated in terms of restoration models and relevant technologies. The possibility of applying these models and technologies in other areas is to be assessed based on the understanding of CF development in Cambodia from Activity 10.2. A policy recommendation will be drafted and submitted to the national FA to promote the practice of integrated CF management in Cambodia.

- **Technical requirements:** (1) Policy recommendation should not go beyond 4,000 words with clear structure and accurate wording. (2) Achievements and effects of the project should be objectively described and the feasibility to extend models and technologies in other areas should be rigorously analyzed. (3) Advices and comments from other interested parties should be canvassed and absorbed in the recommendation. (4) Strategy to implement the extension of models and technologies in other CFs should be recommended.
- **Responsible parties:** The policy recommendation will be drafted by the senior professional team in IRD, with the assistances from international and domestic experts.
- **Timeframe:** Policy recommendation will be submitted at the end of the project.
- **Budget:** \$ 2,800.
  - APFNet: material and writing cost: \$ 2,800

#### Activity 10.4 Participate in APFNet's project experience sharing activities

- **Description:** The project will support project team members, FA officers, local technicians and community representatives to participate international experience sharing activities, in particular the conferences organized by APFNet. The goals of this activity are: (1) to extend experiences learnt, knowledge accumulated, and technologies achieved in Cambodia, (2) to access information and knowledge from other economic entities, and (3) to expand the influences of APFNet in Lancang-Mekong regions.
- **Requirements:** (1) Candidates to participate international conferences should be directly or indirectly involved in the project implementation; (2) Candidates should be capable to express their opinions clearly; (3) International trips will not go beyond 5 person-times.
- **Responsible parties:** The project team in IRD will be responsible for nominating the candidates.
- **Timeframe:** The participation will be taken place whenever the international experience sharing activities are being carried out.
- **Budget:** \$ 9,175
  - APFNet: \$ 9175: International travel: \$ 5000 ( $\$ 1000/\text{person-time} \times 5 \text{ person-time}$ ); Accommodation and food: \$ 3375 ( $\$ 225/\text{person-day} \times 5 \text{ person-time} \times 3 \text{ days/time}$ ), \$ 800 for other costs (visa, insurance)

## Internal monitoring

- **Description:** During the course of implementing the project, an annual-basis internal monitoring will be conducted to know the progresses and effects of implementation of activities of the project. The internal monitoring is essential because the monitoring reports and annual work plan are major materials to be submitted and approved during the PSC meetings. The monitoring includes the progress of implementation of activities and the effects of each activity. The former refers to the progress of purchase, construction, establishment, and installation of equipment and facilities and project sites. The latter includes monitoring of the growth of trees in plantations and the controls, operations of the forest watchers, and benefits generated from the project implementation, etc.
- **Requirements:** (1) Each activity should be carefully monitored once it begins; (2) Monitoring should be properly designed, prepared, implemented, documented and reported; (3) Unexpected accidents and remedial measures should be reported to the APFNet before regular PSC meetings.
- **Responsible parties:** The project management team is responsible for monitoring of the progresses of project implementation, while project (field) staffs is responsible for monitoring of the effects of project implementation under the arrangement of the project management team.
- **Timeframe:** Monitoring of the progress of implementation of activities will be mainly carried out in the first and second years in the project duration. Monitoring of effects of the project implementation will be mainly carried out in the third and fourth years.
- **Budget:** \$ 17,800
  - Executive Agency (IRD): \$ 17,800. Travel expense: \$ 12,800 ( \$ 80/person-day × 2 persons × 20 days/year × 4 years); Labor cost: \$ 4,000 ( \$ 10/person-day × 5 person × 20 days/year × 4 years); Supplies and materials \$ 1,000 (measuring tools \$ 500, office supplies: \$ 500).

## External evaluation

- **Description:** APFNet will recruit the international expert to conduct external evaluation every year, so as to guarantee the realization of outputs and objectives and the achievement of project goal. The evaluation covers detailed comparison between completion and workplan of all activities, effects of project implementation, outstanding achievements and existing problems. In addition, the ecological, social, economic influences of the project implementation are important during the evaluation.
- **Requirements:** (1) International experts recruited should be those who are competent in APFNet's project management requirements; (2) International experts are required to carry out evaluation and submit evaluation reports on time; (3) External evaluation has to be based on monitoring reports, oral reports

of project management team, and field surveys, etc.

- **Responsible parties:** (1) Recruitment and management of international experts are handled by APFNet; (2) Domestic consultants can also be recruited to work with international experts if necessary; (3) Project management team and project staffs are required to assist the evaluation.
- **Timeframe:** Evaluation will be carried out in every 11-12 months after the inception of the project. The evaluation reports should be submitted in 1 month after the field survey and assessment.
- **Budget:** \$ 123,425.50
  - ❑ APFNet: \$ 123,445.50. International travel: \$ 8,000 ( \$ 1000/person-time × 2 persons × 4 times); Consultancy cost: 66,000 ( \$ 550/person-day × 2 persons × 15 days/time × 4 times); Accommodation and food of international consultant: \$ 16,800 ( \$ 140/person-day × 2 person × 15 days/time × 4 times); Vehicle rental: \$ 4,000 ( \$ 100/day × 10 days/time × 4 times); Domestic consultancy cost: \$ 24,000 ( \$ 300/person-day × 2 persons × 10 days/time × 4 times); Food and lodging of domestic consultant: \$4,000 (\$50/person-day × 2 persons × 10 days/time × 4 times); Supplies and materials \$ 445.50.
  - ❑ The external evaluation budget of USD 123,425.50 shall be retained by APFNet.