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## Preface:

This manual is entitled: “**Participatory Forest and Agriculture Land Use Planning, Allocation and Management**” and abbreviated as “**PFALUPAM**”.

This handbook was developed in accordance with the Decision of the Ministry of Natural Resources and Environment No. 7838/MONRE, dated 09 November 2012, for the revision of the previous manual on “**Participatory Agriculture and Forest Land Use Planning Manual at Village and Village Cluster Level**”, adopted by the Ministry of Agriculture and Forestry and the National Land Management Authority, in 2010.

This Manual contains of main tools that vary from case to case, as processing approach with 5 specific steps as below:

- Step 1:** Preparation of personnel, budget, forms and equipment in the office;
- Step 2:** This is the 1<sup>st</sup> round of field mission to work with local communities for: to appoint local PFALUPAM committee, to collect information and data on socio-economic and on agro- biodiversity, to conduct survey on village boundaries and develop the basic maps of village;
- Step 3:** This is the 2<sup>nd</sup> round of field mission to work with local communities for: to develop the current land use maps and assessment of soil fertility;
- Step 4:** This is the 3<sup>rd</sup> round of field mission to work with the local community for: to develop the **Forest and land use management zone (FLUMZ)** and to facilitate villagers and local authorities to develop specific regulation on village’s forest and land use management, including to promote villagers to implement the FLUMZ plan;
- Step 5:** This is the 4<sup>th</sup> round of field mission to work with the local community for: to monitor or evaluate the implementation of the FLUMZ plan and facilitate the relevant organization to issue the land use registration certificates and land titling to local community and family as possible.

Although this manual is completely designed, but the approach or methods as well as its tools can be adjusted to suit the needs and responsibilities of different organizations.

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### **Other sections:**

In addition, there are also the central and local organizations, especially PFALUPAM staff from PAFOs of Luang Prabang, Xieng Khouang and Houaphanh provinces, PFALUPAM technical assistance of TABI and concerned projects and the CDE.

**Edited by: Mr. Pheng Souvanthong, July 2020**

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# Part 1: Introduction:

## 1.1 Objectives:

The main objectives of this Manual on **Participatory Forest and Agriculture Land Use Planning, Allocation and Management (PFALUPAM Manual)** are to:

- ✚ To encourage the participation and ownership in the implementation of activities related to the governance and management of natural forest resources and agricultural land use that provided maximum benefits to livelihood development by creating fixed occupation for local villagers;
- ✚ To facilitate the government technical officers of all levels, especially at local level (province, district, clusters) and the village administration authorities including all ethnicity villagers for taking full responsible and common agreement on the implementation PFALUPAM approach in order to develop local livelihood occupation and upgrade the living condition standard of the rural families towards the development of socio-economic, along with the protection of environment according to local landscapes situation;
- ✚ To develop an accurate and precise data-base, maps and plan on **Forest and Agriculture Land Use Management Zone (FLUMZ Plan)** that consisted with reality of local situation and provide for all stakeholders to use it as evidence-base into the development of policies, strategies, programs, investment plan and socio-economic development.

## 1.2 PFALUPAM vision:

### ▪ PFALUPAM Vision is to:

- ✚ To develop the **Forest and land use management zone (FLUMZ)** that is “**belong to and truly owned by villagers**” and enable villager to follow implementation with strongly responsible according to the reasons as below:
  - I. Be able to reflect the real situation and feasibility of the local area in the development and management of agricultural and forestry land use and various management systems;
  - II. Can show to the central and local authorities that PFALUPAM is an effective way to contribute to the formulation of rural development policies, strategies and programs;
  - III. PFALUPAM Process, is an approach that taken full participation of local villagers in real implementation with comprehensive basic intention and actively and effectively determination made by villagers themselves.
- ✚ To develop forest and agricultural land management zone plan that satisfy and are approved by relevant GoL agencies, because the plan:
  - I. Reflect an improvement in - and a model - for land and forest management;
  - II. Facilitate - provide the basis for - the work of both MAF-PAFO-DAFO and MONRE-PONRE-DONRE; and provide a basis information and data for the development of agricultural and forestry in the future.

## 1.3 Some basic principles and key aspects of PFALUPAM:

- 1) Where possible, work in all villages in a Village Cluster, and establish the inter-village network from the start (while working on village boundaries).
- 2) Do not try to implement and finish the whole process in one village during one (long) field mission. Instead, the team should make at least 3 shorter missions to each village (see section 4, below).

- 3) Must focus on assessment and mapping of **Current Land Use and Forest Cover (CLUFC)**, and by forest cover is meant forest that have not been never cleared for agriculture as part of the swidden cycle before.
- 4) Accept areas of upland crops and bush fallow as the current reality, and look for ways to stabilize, not eradicate.
- 5) During the CLUFC assessment, make planning/zonation of forest lands with villagers, do not use the word "3 forest categories of GoL" as this will confuses the work. The aim is for villagers to report and delineate forest lands as they see them, without any policy or external filters, which is the only way to make it truly 'participatory'.
- 6) Finally, the results on "forest and land use management zone (FLUMZ) plan" must be realistic and implementable by villagers and by GoL.

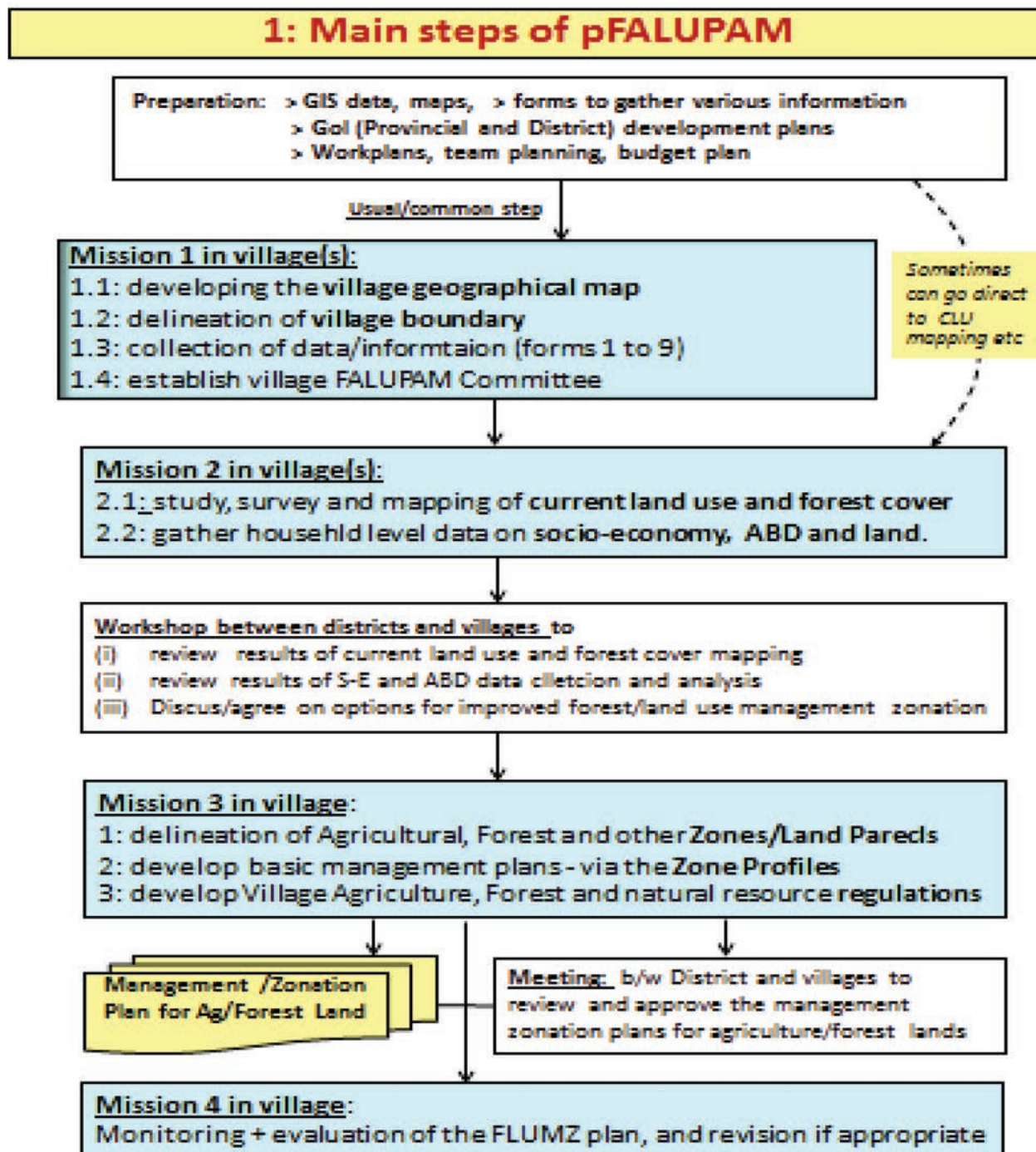
#### 1.4 Basic step or progression of the PFALUPAM approach:

The basic progression of the work of PFALUPAM approach is as follows:

- 1) **Preparation:** including selection of the target area and village, preparation of imagery and initial (raw) maps of the area, preparation of the team, the materials and equipment and the workplan and budget;
- 2) The conduct of **Village Mission 1**, which focuses on: (i) Village Geo Mapping, Village Boundary mapping/agreement, and (iii) the gathering of basic data from the village administration and PRA focus groups on socio economy, agro-biodiversity and key crop profiles.
- 3) The conduct of **Village Mission 2**, which focuses on: (i) current land use and forest assessment and mapping, and (ii) collection of key data at the household level.
- 4) **Office work** to (i) produce GIS maps (of CLUFC) and data based on the participatory mapping work in village mission 1 and 2, and (ii) checking, keying-in and compiling all the data sets from village missions 1 and 2. Then, to analyse all these data and prepare for the next round of district and village workshops.
- 5) Conduct of the **District and Villager meetings**, normally at the districts centre, but also maybe at Koumban office to review the maps and data gathered from mission 1 and 2, especially comparing the land use data from mapping with the info from household interviewed, and then developing a consensus on the strategy to develop and improve the forest and land use management zone, that to be undertaken in mission 3.
- 6) The conduct of **Village Mission 3**, which is the development of **forest and land use management zone (FLUMZ)** Planning, the output being (i) village FLUMZ maps, (ii) management profiles of the main agricultural land and forestry zones and (iii) develop and/or improved the village regulations on land use and forest management.
- 7) **Office work** to produce (i) GIS FLUMZ maps, and (ii) the draft the "Village FLUMZ Plan" document, which includes all information and maps from the process in that village.
- 8) **Organize meeting** to seek the village and concerned agencies comments on the FLUMZ plan, revise that plan as required, and then develop the village proposal letter to the district governor for official approval.
- 9) Based on the **provisional agreement of district and the PAFO and PONRE**, then copies of the maps (for posting in the Village Office) and the draft the "Village FLUMZ Plan" are given to (i) the Village PFALUPAM committee, (ii) the DAFO, and (iii) the PAFO, at least.
- 10) After 1 year, and then 2 to 3 years pilot implementation of the draft "Village FLUMZ Plan, the conduct of **Village Mission 4** is to monitor and review the villager's ability to follow the FLUMZ, or other non-villager land use changes, and then revision of the FLUMZ as appropriate.

*Note: The number of monitoring missions required will depend on the complexity of land use in a village, especially in upland or resettled villages. However, once all the villages have passed thru PFALUPAM once, then the district can make a plan to review FLUMZ plans once every 3 to 5 years, i.e., all villages would be reviewed at least (and reported) once in the districts 5-year planning cycle.*

The flow of work in village clusters is illustrated in the diagram below:



### 1.5 Implementing in all villages of a cluster's village:

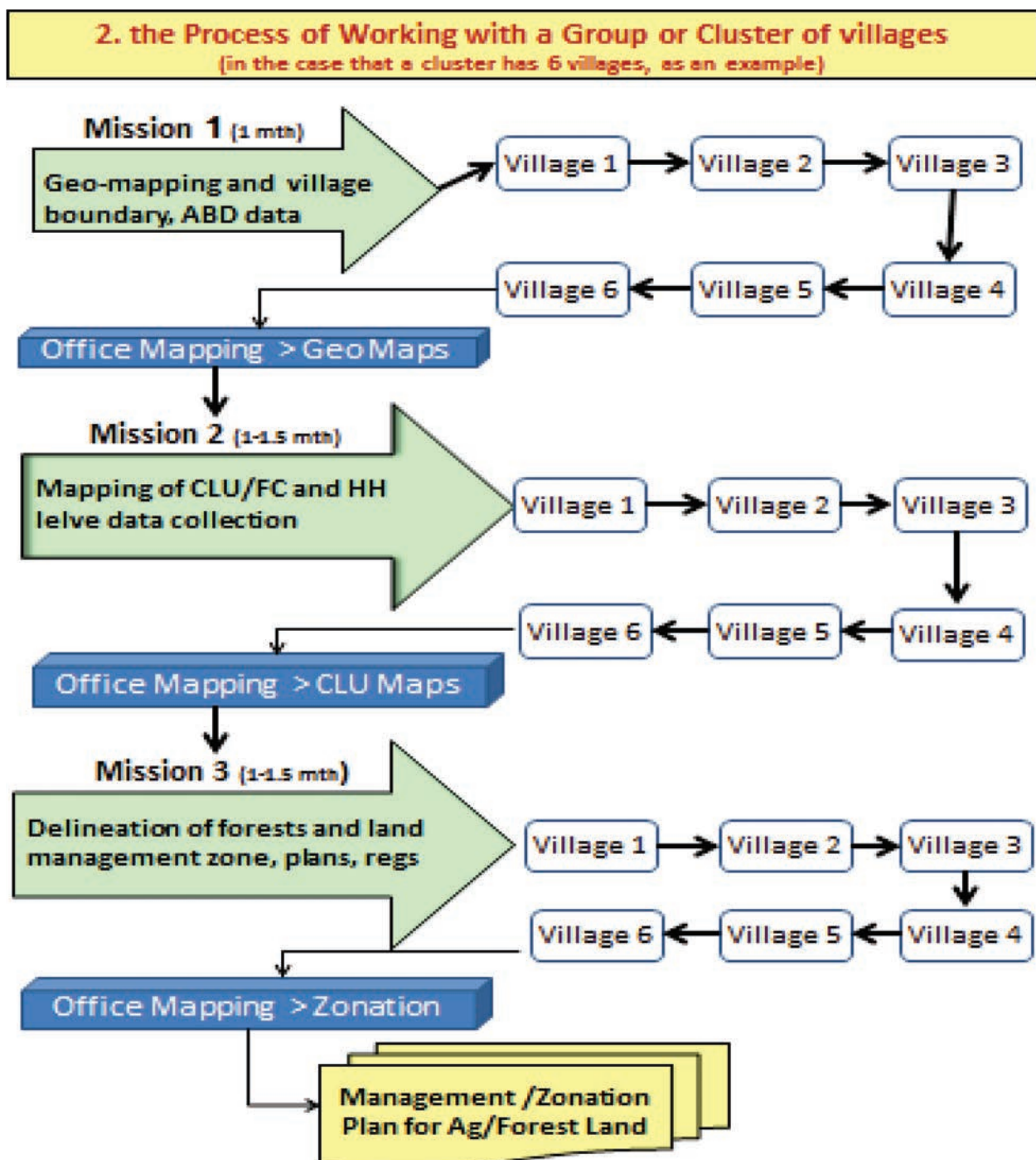
The Governments arrangements of village cluster ('Koumban', in Lao language) provide a very good frame work for more effective and efficient forest and land use planning, whereby the implementation teams make repeated, but shorter visits, to each village, and in each

visits (or mission) are able to focus on a specific set of topics, rather than trying to complete the whole process in one village over one long mission.

This system has many advantages, such as:

- 1) The team can focus on a small set of tasks, and develop skills and quality in the work.
- 2) The team is not burden on the villagers, who only have to take out 3 days at a time from their livelihood activities to work with the team.
- 3) It gives villagers time to become familiar with the maps for gradually developing.
- 4) Enable time for all maps and data be checked/developed before going to the next step.
- 5) Ensures that village boundary and current land use assessment and maps are review by the districts and villagers, before going to the important future zonation steps.

Another way to illustrate the main steps of PFALUPAM:





## 1.6 Approximate time spent on the PFALUPAM process:

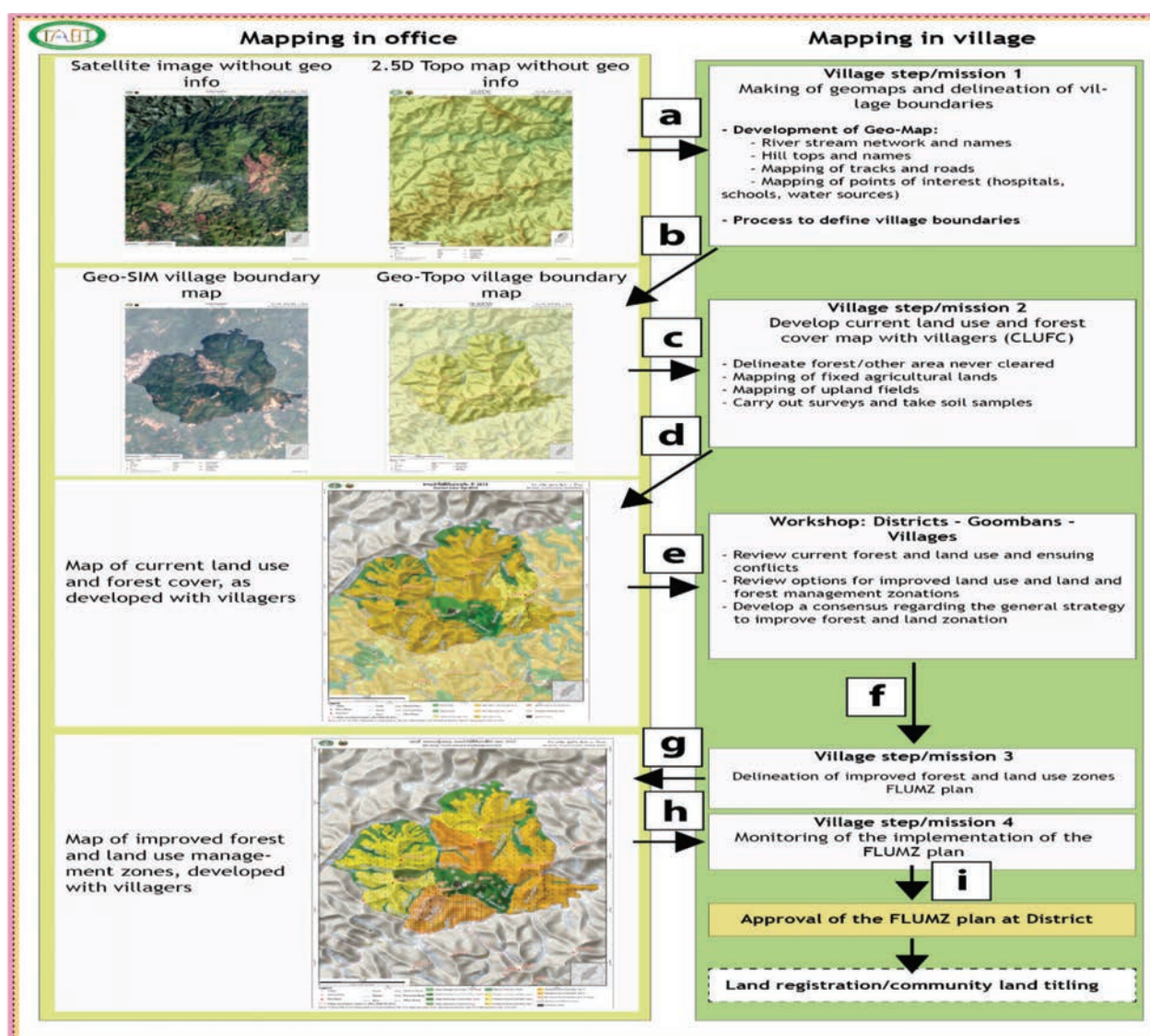
The Table below outlines the approximate time spent on the main steps of the PFALUPAM Process

Main steps	Indicative time required (assume an 8-village cluster)
preparation	Office work, ideally, in wet season
Mission 1	2-4 days/1 village = 1 month for 8 villages
Mission 2	3-5 days/1 village = 1.5 month for 8 villages
Review-Planning Workshop: District-level	Preparation: 2-3 week, then Meeting of 1 day
Mission 3	3-5 days/1 village = 1.5 month for 8 villages

## 1.7 The flow of “Map Making” in PFALUPAM:

The process of mapping and linking villager-to-villager mapping and GIS data mapping, is an integral and interdependent process that is an integral part of the participatory land use planning, allocation and management (PFALUPAM) process

The diagram below illustrates the flow of the main steps in the mapping for PFALUPAM:



## **1.8 Mission 3: Delineation of agricultural and forest land management zones:**

The third mission in the village is when the actual zonation, the planning for improved forest and land use planning is undertaken, and is the most challenging phase of the whole process.

### **1.8.1 Objectives of mission 3:**

- 1) To delineate and zone of forest and agricultural land, which is a compromise between:
  - (i) the complexity of the mosaic of landscapes of rural Lao; and
  - (ii) the need to develop monitorable and manageable zones of agriculture and forestry.
- 2: To delineate and zone the agricultural land in a way that responds to the production requirements of farmers, but also prevents land degradation.
3. To organize the land and forest zones in a managed way, to not only facilitate production and management of the land and forest, but also to facilitate the eventual tilting of the land and forests at both community and household levels.

### **1.8.2 Key aspects of the methodology to delineate forest lands:**

- 1) Review, together with villagers, the mapping of current forests and forest never cleared.
- 2) Enable the villagers to point out, to delineate the areas they want to zone as 'forest', which will include current forest never cleared, and areas where they want to regenerate as village's forest.
- 3) Draw in the boundaries of these areas on the (i) CLUFC and (ii) the satellite image map.
- 4) Then use the "Forest Zonation Profile" form to ask a series of questions relating to each forest zones, which results (i) in the 'reason' that villages wish to maintain as a forest, or regenerate an area as forest, and (ii) how they will manage the forest.

### **1.8.3 Key aspects of the methodology to delineate agricultural land zones in upland landscapes:**

- 1) Review, with villagers, the current land use maps, especially location of upland fields in previous years, and assess:
  - (i) Are they group or scattered around the landscape? and
  - (ii) Are there any land claims or ownership in the upland areas?
2. Decide on the maximum number of years rotation possible in the upland crop/bush fallow area, considering the following:
  - (i) The total area of the village, and the amount of rice required to be produced, by how many families, from the upland fields;
  - (ii) The areas decided to be zoned as forest lands;
  - (iii) The areas of fixed agricultural land now, and in the future; and
  - (iv) The need to zone for a minimum years rotation of at least 3 to 5 years, depending on soils and slopes, in order to conserve the soil and ensure food security.

### **1.8.4 Compare the upland cropping zonation as a group with scattered plots:**

#### **❖ Upland crop production in a "scattered system":**

##### **• Advantages:**

- 1) Possibly, decreased risk of soil erosion;
- 2) Maybe, easy for each household to gather NTFPs near fields; and
- 3) Easier for villagers to buy and sell upland fields and bush fallows.

##### **• Disadvantages:**

- 1) Scattered bush fallow fires can cause big danger on forest and fallow fire, leading to degraded landscapes;

- 2) Impossible to define clear boundaries between upland crop fields/fallow, and forest;
- 3) Difficult to control pests, and livestock;
- 4) There is not easy for extension agents to access;
- 5) Maybe uses more labour for fencing etc;
- 6) Very inefficient to make small access track to a lot of scattered fields; and
- 7) Cannot process and provide land titles.

❖ **Upland crop production based on large groups/zones:**

- **Advantages:**

- 1) Easier to control forest/fallow fires, to maintain or restore landscape health.
- 2) Easy to manage livestock, and maybe decreased labour require for fencing.
- 3) Communal construction of the one field-access track, and easy to transport production back to the village, which also means less post-harvest losses.
- 4) Easier to define and mark the boundary between agriculture and forestry zones, and thus easy to process (essential for) community land title.
- 5) Promotes community cohesion and fairer for poorer families.

- **Disadvantages:**

- 1) Potential for increased soil erosion due to contiguous upland plots, need to manage, and crop only 1 year, not 2.
- 2) Maybe will infringe on the benefit of persons with a lot of land, or who have 'purchased' land in the uplands, but will help those families with insufficient land.

## 1.9 Useful of the Forestry and Land Use Management (FLUMZ) Plan:

The FLUMZ Plan provides a good framework for, and a lot information and analysis on which to base on:

- 1) Agricultural extension and development, and
- 2) Village forestry development, management and utilisation.



## Part 2: Contents for implementing the PFALUPAM approach:

### Stage 1: Preparation:

The preparation stage is an office job which includes 2 main steps as:

#### Step 1: Prepare the work plan, budget, personnel, equipment and tools:

Before beginning real work on Participatory Forest and Agriculture Land Use Planning, Allocation and management ( PFALUPAM ), must have to prepare many titles that included: 1) the central team and experts (if necessary), estimated number of local districts, clusters and villages including number of villagers and mass-organization to participate , 2) compile the data, clarify the provincial and district goals, 3) develop the budget plan, 4) set-up the task or daily activities, and 5) procure of materials, equipment, tools and facilities for conducting of real work for both working in the office and in the field. Details on preparation are summarized below:

##### 1) Team organizing:

In total, the PFALUPAM team to work at the village level will include 2 – 3 central officers, 2-3 provincial officers and 4-5 district officers, including 8 -11 villagers. But depending on the size and actual working conditions of the village. basically, requires the following staff and villagers to participate:

- **Central level:** Department of Agricultural Land Management and Development (DALaMD) of the Ministry of Agriculture and Forestry (MAF) and possibly the Department of Land Management and Development (DoLMD) of the Ministry of Natural Resources and Environment (MoNRE);
- **Provincial:** Agriculture Land Sector of PAFO and PONRE;
- **District level:** Agriculture and Forestry Office, Internal Office (Round 1), Office of Natural Resources and Environment (Round 3), Women's Union, Lao National Front for Construction and Koumban Office;
- **Village:** The Village Administration Authorities, the village PFALUPAM committee, the mass-organization, key person to provide information and leading the way to forest, and all ethnicity groups as well as women represented from every family.

**Table 1: Typical composition of a PFALUPAM working team:**

No	Team Member – Function	Number of	Comment
1	GIS team	1	1 and 2 can be same person
2	Paper/Participatory Mapping	1	
3	Field and GPS survey team	1 - 3	3 and 4 can be same person
4	Interview and data collection team	2 - 3	
5	Coordination etc	1	VC head, LNF
6	Soil quality survey and evaluation	2	Staff + villagers: soil collection
	Total	8 - 11	

*Remark: One of the mentioned above staff will be assigned to be as the Team Leader and has to make report to village and district authorities.*

## 2) Budget:

The budget for implementation of PFALUPAM is based on the calculation rate of daily subsistence allowance and accommodation for different level of staff and villagers in compliance with the Ministry of Finance Notice on administrative budget payments, document number 2066/MoF dated 25/06/2015. Overall budget planning documents would include in calculation plans for: (1) DSA plus working timesheet of each staff from the central, province and district levels , (2) DSA of thee cluster village and village authority and villagers who actually join the work , (3) Fuel cost for motorcycles of the team and villager , and (4) cost for purchasing materials , equipment and tools to be used by making separated calculations for each specific items as in the tables 2, 4, and 5.

For the conclusion/summary/report of expenditures for each person level involved, is to separate the receipt items as: 1<sup>st</sup> for central officer, 2<sup>nd</sup> for the province staff, 3<sup>rd</sup> for district staff, and 4<sup>th</sup> for cluster village authority, and villager.

**Table 2: Calculation for DSA cost:**

No	Name	DSA				accommodation			Total budget
		No	Nr. days	rate	sub	No	rate	sub-total	
1									
2									
	Total:								

**Note:** Each staff from the central, provincial and district levels who join PFALUPAM work at village must make a timesheet or note of the working day (Appendix 2) attached to table 2 as well as table 3 as below:

**Table 3: Workday Records:**

Workday Records Round: ... .. Monthly : . . . ( Date ..... to date .. . . .)

Office Name .....

Name and Surname : ..... , Responsibilities : .....

Number of days from date to date	Activities done	Place of work/village	Signature and stamp of the village head
.... .. to .. ..			
.... .. to .. ..			
Name of record holder	.....	Name of certifier (head)	.....
Signature	.....	Signature	.....
Date	.....	Date	.....

**Table 3: Calculation of fuel costs:**

No.	Person/team	No. day	No. village	No. of travel	Oil rate	Total money
1						
Total:						

**Table 4: Calculate the cost of purchasing materials, equipment and tools:**

Make a single sheet, but separate item into groups of different kinds of materials, equipment and tools:

No	Items	unit	Price / unit	Total money
1				
Total:				

**3) Daily activity planning (work calendar):**

Scheduling the actual working day, both in the office and in the field. There is a way to predict a calendar of activities/tasks that need to be done on a daily basis, as shown in Table 6 below:

**Table 6: Example of works implemented in the first round in one kumban consisting of 6 villages:**

Job Description	11 months							Month 1 2																	
	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Meetings in the district and plan round 1 and train local teams	X	X	X																						
Travel into Kumban and Village 1				X																					
▪ Work at village 1					X	X	X	X																	
▪ Work at village 2									X	X	X														
▪ Work at village 3												X	X												
▪ Work at village 4														X	X	X									
▪ Work at village 5																X	X								
▪ Work at village 6																		X	X	X	X				
Summarize data by district or kumban																						X	X		

**Note:** Most of this table is intended to do what a change it may cross days and months.

**4) Equipment and tools for using at field work:****Table 5: List of materials, equipment, and tools:**

No.	List of equipment	Unit	Head	Cause
<b>I</b>	<b>Personal equipment</b>			
	Clothes, hats, shoes, raincoats, bags, dances, sleeping bags			According to the number of employees
<b>II</b>	<b>Team work equipment for village work</b>			
	Desk: Used for computer backing	2	Series	
	Electrical machinery, wires, lights, plugs and cables	1	Series	In case of no electricity at village
	Mobile speakers	1	Series	
<b>III</b>	<b>Technical tools</b>			
	Computer for mapping with memory card	1	Series	With data cable
	Computer for general information with memory box	1	Series	
	Overhead LCD screen	1	Series	
	Film documents (Printer)	1	Machine	

No.	List of equipment	Unit	Head	Cause
	Combine GPS with battery and charger	2	Series	
	Small camera	2	III	
<b>IV</b>	<b>Equipment for mapping of village level</b>			
	Small size drawing pen (14 colors) and medium size (4 colors).			
	Drawing pen on the map (in the case of transparencies)			
	Plastic sheet for translating satellite-aerial images			
	Colored paper (1.5 to 2.5 cm wide) for writing names.			
	60 cm long line (steel or rubber)			
	Scotch tape 1-2 cm wide to attach paper and map			
	Rocket on the map (waterproof)			
	Colored needles and colored cotton yarn to embroider maps and paper.			
<b>V</b>	<b>Other devices</b>			
	Large sheet of white paper, size A 0 and A4 paper			
	Notebooks, pens, pencils, erasers, coffee and cafe balls, perforators, irons, envelopes, cutters and scissors			
<b>VI</b>	<b>Device for collecting soil samples (optional)</b>			
	Glass shovel, knife Jim Land, knives, steel penetrate the soil, wood meters (2-3 mm), bags of soil, ground - book color			
	Chemical HCl 10%			
	Tools Soil Test Kit			

## Step 2: Preparation of Forms for data collection:

The forms for gathering socio-economic, agro-biodiversity and other key data, forms to record field survey observations and readings, formats for various records of meetings and agreements, and formats for profiles of land and forest management zones are listed in table 1 below:

**Table6: List of forms for gathering and recording date related to (and during) PFALUPAM:**

Form No.	Name the form and draft of the document	Cause
	<b>Collection Form</b>	
<b>I</b>	<b>Round 1 data collection form</b>	
1	Collect general information of the village (initial)	Village level
2	Collection agro-biodiversity farm 's village	Village level
3	The production and the calendar to grow crops agriculture on the principle of village	Village level
4	Collect information on harvest, condition and priority of non-timber forest products	Village level
5	Collect information on clearance, use and priority timber	Village level
6	Collect wildlife data	Village level
7	Collect aquatic data	Village level
8	An inventory of problems and solutions	Village level
9	Collect information on the conditions and potential for village development	Village level
10	Record the results of the survey of key geographical locations	Village level
11	Record survey reference point areas of the river water	Village to village
<b>II</b>	<b>Round 2 data collection form</b>	
12	Rice needed for household consumption	Family level
13	Collected revenues of families	Family level
14	Collect family-level land use information	Family level
15	Record soil samples	Village level
16	Save space exploration agriculture and forestry in the deal now	Village level
<b>III</b>	<b>Round 3 data collection form</b>	
17	Record area of agricultural land allocation and management	Village level
18	Data management zones and the use of forest land	Village level
19	Record the coordinates of the allocation area according to the agricultural and forestry land use plan	Village level

Form No.	Name the form and draft of the document	Cause
	<b>Collection Form</b>	
20	Review and update the rules governing the use of agricultural land and forests of village	Village level
<b>IV</b>	<b>Round 4 data collection form</b>	
21	Monitoring and <b>evaluation</b> of PFALUPAM implementation outcomes	Village level
	<b>Draft document</b>	
	<b>Draft document Round 1</b>	
1	Draft of the village application letter for the appointment of the village PFALUPAM committee	Village level
2	The proposal of the Agriculture Committee to appoint responsible PFALUPAM village	Office of Agriculture
3	Draft a memorandum of jurisdiction of the village	Interior office
4	Draft decision of the mayor on the appointment of PFALUPAM village-level committees	Mr. Mayor
	<b>Draft document round 3</b>	
5	Proposal the of The Village to Adopt the Plans the Management of land Use, Agriculture and Forestry (FLUMZ) Village	Ban Sare
6	The proposal of the office until the district to adopt a FLUMZ village	EPA Office
7	The draft plan adopted FLUMZ of district	The mayor
	<b>Draft document Round 4</b>	
8	Draft monitoring and implementation report on village level FLUMZ plan	Village level
9	Draft report to monitor reviewing the land use plan FLUMZ	PAC Office

#### **Use of Form (1-21) for:**

**Form 1: General Village Data Collection (starting work):** is to collect general data on village history, population, employment, infrastructure, livestock, production, tools, previous land use activities and status (land and forest allocation), projects and various activities in the village of the past and present and etc. This information is collected directly, via interview, from the village administration authorities.

**Form 2: Data on Agricultural and Biodiversity:** is also collected by interview of the village administrative authorities. The objective is to develop a general overview or profile of the agricultural systems and agro-biodiversity, including name of rice varieties and crops in different agro-ecosystems of the village and the length of rotation of upland rice cultivation, but also on livestock, on forestry types and ecosystems, etc

**Form 3: The production and the calendar of planting main economic crop of the village:** is to collect information on about the season to grow plants, the number of species in the area, the location and production conditions, such as production costs, yields and income from the production of each major crop.

**Form 4: Collect information on harvest, condition and priority of non-timber forest products:**

Form 4. 1. Collect information on the harvesting, sale and condition of all types of non-timber forest products (NTFP): Collect information on the state of abundance and the important role of natural resources in villager's livelihoods, such as the economy, food, medicine and consumption. Selling information - revenue from non-timber forest products at the village level and the condition of each species.

Form 4. 2. Collect priority NTFP products: Collect information on endangered NTFP products, species that villager want to manage and restore in the forest, and species that villager want to grow in orchards or economic gardens.

**Form 5: Collect information on wood exploitation (logging), use and priority timber species:**

Form 5. 1. Collect information on the collection and use of timber: Collect information on abundance and yield of timber product that related to villager's livelihoods, such as the sales and income from timber and the status of each timber species.

Form 5. 2. Collect information on priority trees species: Collect information of endangered or disappeared species, species that villager want to restore in the forest, and species that villager want to plant in orchards or economic gardens.

**Form 6: Wildlife data collection:** Collect data on wildlife species and their importance related to villager's livelihoods and ask about the status of each wildlife species and the reasons for its change.

**Form 7: Collect information on aquatic animals:** Collect information on aquatic species and their importance to villager's livelihoods. And the status of each aquatic species and the reasons for the change.

**Form 8: Problem census and solutions:** Gather information about the problems and the causes of the problems as well as the impact and ideas/ways to solve the problems of the village/community.

**Form 9: Ddevelopment condition and potential of the village:** Collect information on the conditions and potential for the development of the village, such as agriculture, forestry, health and others.

**Form 10: Record of geographical location surveyed:** Record the data from actual survey by using GPS and form to record only streams, hills and landmarks of the village.

**Form 11: Record the reference point area surveyed:** Record the data from the real area survey by using GPS device and record the information about the boundary of village area only.

**Form 12: Collect information on population, demand for rice and livestock at the household level:** Collect information on population, labor, occupation and livestock type of villager.

**Form 13: Family income collection:** Collect household level information on overall income and basic income of each family in the village.

**Form 14: Collection of information on the ownership, tenure and use of family land:** Collect information on ownership, possession and method of land use of each family in the village.

**Form 15: Record soil samples:** collect information about conditions and physical characteristics of the soil and analysis during the operation soil samples collection that conclude 3 key points as: 1) the location and environment of the soil pit , 2) general characteristics such as soil depth, content and color, and 3) description of each layer (Form A4)

**Form 16: Current agricultural and forestry land survey records:** Record data from land surveys by using GPS. This form is to record information on current agricultural, forest and other land in the village.

**Form 17: Agriculture land use management area:** Record the data of each agriculture land area allocated according to the village FLUMZ plan which consisted of 7 main points as 1) name of the area by local language, 2) location and typical geography of the area, 3) the reason and purpose of use, 4) the management and use since the past up to present, 5) the family name who conduct cultivation in the area, 6) plan to prevent forest fire

(production family in the area), and 7) regulations on the management and use of such agricultural land.

**Form 18: Forest land use management area:** Record the data on forest land allocation and management area (according to FLUMZ plan) of the village that consisted of 8 main points as: 1) local name of the area, 2) the location and typical geography of the area, 3) the reason and purpose of use, 4) the management and use since the past up to the present, 5) list of cultivator households in the land area, 6) village direction/plan for forest rehabilitation, 7) village forest fire prevention/protection plan, and 8) regulation on management and use of specific area of forest land.

**Form 19: Record the coordination points of the forest and agriculture land use areas that's already zoned, allocated and planned:** Recording the coordinate points of the zoned areas by using GPS in real field survey. This form is for storing the agriculture farm land, forest and other important land within the village.

**Form 20: Review and update the regulation on management of agriculture and forestry land use:** it's necessary and important to be able to follow the FLUMZ plans in order to upgrade the quality of life of villager of all ethnic groups that directly linked to the use of agricultural land and natural forest resources.

**Form 21: Monitoring and evaluation the results from the implementation of FLUMZ:** to study and record the data compared with existed data collected from interviews, discussion and sharing of lesson/data in meeting with villager on results from FLUMZ.

**Utilization of documents (1 - 9) for the following purposes:**

Step 3 of Stage 2 is applied 4 documents (1 - 4) and step 2 of stage 5 is used 5 documents (5 - 9) the total context of the document is:

**Draft Doc. 1: Proposal letter to request to assign the village PFALUPAM committee (by village administration authority):** This proposal letter is made by village administration authority, based on the outcome of the discussion and consents reached between villagers and village organizations, including a list of names and responsibilities of each committee member. It is proposed through District Agricultural and Forestry Office (DAFO) to further submit to the District Governor for issuance of the decision on assignment/appointment of such responsible committee for village PFALUPAM.

**Draft Doc. 2: Proposal letter for appointment of village PFALUPAM committee (proposed by the DAFO):** The District Agricultural and Forestry Office needs to draft a proposal for the appointment of the responsible committee for village PFALUPAM level in accordance with the proposal submitted by village organization to request the District Governor taking into consideration and approval in compliance with the applicable regulations.

**Draft Doc. 3: The agreement of the District Governor to appoint the village PFALUPAM committee:** Is a justification and endorsement document to certify upon proposal of village administration authority to appoint the village PFALUPAM committee that issued and agreed by the District Governor.

**Draft Doc. 4: Memorandum on village boundary:** This is a memorandum of understanding and consent on the boundary between one village and another village. This document needs to be agreed to, and signed, by all conjunction villages' organizations, and submitted through the District Interior Office to the District Governor for further consideration, approval and promulgation.



**Draft Doc. 5: Proposal from village administrative authority for adoption the village's FLUMZ plan:** It's a proposal letter from the village administration authority proposed to the District Governor through the District Agriculture and Forest Office and other concerned offices for issuing agreement on acceptance of village FLUMZ plan.

**Draft Doc. 6: Proposal from the Agriculture and Forestry Office to endorse the village FLUMZ plan:** Proposed from DAFO to District Governor to certified and approved of village FLUMZ plan.

**Draft Doc. 7: Approval or agreement letter to approve the village FLUMZ plan by the District Governor:** It's the certifying document from the District Governor approved of village FLUMZ plan, according to the request of the village.

**Draft Doc. 8: Monitoring and evaluation form on compliance with the village FLUMZ plan:** The agriculture land area that villager use for permanent cultivation or small village animals' management (constant), the land area that user has the aim to develop as permanent cultivation land.

**Draft Doc. 9: Report form on compliance with the village FLUMZ plan:** Solutions, edit or update village FLUMZ plan and maps according to common agreement.

**Note:** *Description of forms, record and the proposal letter as mentioned above are in specific annexes at separated document/book.*

## Stage 2: Data collection and develop village base map (field mission 1):

### Step 1: Organize the team work and division of group members for working:

There are 4 main working groups as: 1) development of Geo based maps, describing of village's boundary, assessment of current land use, 2) collection of information and data on socio-economy and agro-biodiversity (according to the forms 1 – 12), 3) field survey and GPS work, and 4) conduct the collection of soil samples from village's agriculture land,

**Table 7: Division of working groups and responsibility (number of villagers per group):**

Name of working team	Nr. PFALUPAM Staff	Nr. Villagers	Remarks
Mapping Team	1–2	5–10	Persons who know the land
Data/info collection team	2	15–30	Female and male villagers
Field survey Team	1–2	2–3	Persons who know the land

### Team 1 and Team 3: Work on mapping and field survey:

- 1) Develop the village GeoMap which will show rivers and streams, roads, mountain tops and chains, village water supply, irrigation, water source, caves, schools and temple and other important points/sites etc.
- 2) Consultation, survey and delineation of the village boundary:
  - Start to describe the village boundary according to understanding of villagers and existing info of hosting village;
  - Inform surrounding villages to come to host village for negotiations on each village's boundary;
  - Meeting to consult and negotiate on village's boundaries between hosting village and surrounding village, and if possible, should make villages agreement with signatures.
- 3) Assess current land use (forest that never cleared, forest land, rotation agriculture land, permanent agriculture land and other land types etc.) together with village PFALUPAM committee and villagers by using the satellite image and aerial photos.
- 4) Identify the sites for survey and conduct real field survey on various important sites, village boundaries where not yet have common agreement, forest area that never cleared, permanent agriculture land, other land types and collection of soil sample.

### Team 2: Collection and compilation of data regarding:

- 1) General situation of village
- 2) Agro-biodiversity of village
- 3) Calendar for cultivating of main crop of village
- 4) Harvesting and situation of all NTFP species
- 5) Wood exploitation and utilization of wood
- 6) Collection of wildlife information
- 7) Collection of information on aquatic living and production
- 8) Village problem census
- 9) Condition, potential for development
- 10) Data on population, rice needed for consumption, household livestock situation
- 11) Data on household income
- 12) Data on household land use, holding and occupation.

## Step 2: Meeting to introduce and explain PFALUPAM approach and workplan:

The meeting session should be organized between 1-2 hours. At the meeting, the team leader presents: 1) the objectives and steps to conduct PFALUPAM mission; 2) introduces the technical team members; and 3) explains the PFALUPAM approach, and all activities to be conducted in village (usually over the course of three steps).

The PFALUPAM steps/tasks must be explained to the villager meeting as shown in table 1 below:

**TABLE 10: PFALUPAM steps and task to be implemented at the village level:**

No	Action	Duration
<b>village Mission 1</b>	<ul style="list-style-type: none"><li>▪ Establish the Village Committee to be responsible for PFALUPAM;</li><li>▪ Develop the Village GeoMap, by a participatory approach;</li><li>▪ Consultation with the host and surrounding villagers, then survey and delineation of the Village Boundary;</li><li>▪ Drafting the VB agreement, between the host and surrounding villages.</li><li>▪ Collection of preliminary information on the general situation in the village from the village administrative committee (Village Profile, forms 1 and 2).</li><li>▪ Collection of information, via PRA focus group sessions, on NTFPs, wood, wildlife, aquatic life, problem census, and condition and potential for future village development.</li></ul>	About 4-5 days
<b>village Mission 2</b>	<ul style="list-style-type: none"><li>▪ Collection of information and data at household level on population, livestock, income and land use or occupation;</li><li>▪ Assessment and developing maps on the current forest cover and land use in the villages (CLUFC mapping);</li><li>▪ Field surveys to check on current land use and forest.</li><li>▪ Field survey and collection of soil samples (optional);</li><li>▪ Back in the office, to compile all information and data, and analyse it, and make maps of CLUFC, and draft a first report (desk work)</li></ul>	About 4-5 days
<b>village Mission 3</b>	<ul style="list-style-type: none"><li>▪ Opening conference of the district, by inviting the representatives of the village, to report the results of the implementation steps 1 and 2</li><li>▪ Consultation to determine develop the forest and land use management zoning plan (FLUMZ) and regulatory practices.</li><li>▪ Back to office, compile data, including maps and plans for the forest and land use management zoning plan (FLUMZ)</li><li>▪ Hold a district meeting to approve the FLUMZ plan.</li><li>▪ Open a meeting in the village and explain the plan to the villager (again).</li></ul>	1 day
<b>village Mission 4</b>	Promote and monitor the use of land, according to the forest and land use management zoning plan (FLUMZ)	

## Step 3: Establish the Village PFALUPAM committee:

After finishing the introduction and explanation of objectives and details of the PFALUPAM workplan in the first session of meeting, the technical team leader has to continue and explain to all participants on the establishment of a new village committee to responsible for implementation of PFALUPAM. The team leader will explain: 1) the objective and importance of the PFALUPAM committee, 2) the ToR; and 3) the working procedures for this committee.

Then, the PFALUPAM team will request the Village Administrative Committee to open an additional specific matter meeting to elect the village PFALUPAM committee. Details of proceeding for establishing of the village PFALUPAM committee are described in section 5 below.

**Note:** *The establishment of new village PFALUPAM committee may not to be accomplished in the first session of village meeting for introducing and explaining PFALUPAM. It may be better to wait until villagers are well aware and understand the necessity for establishing such committee, and then organize their own internal meeting for selecting and electing of interested*

*candidates being as their village representatives committee for PFALUPAM and then submit proposal letter to the district major for issuing official appointment letter.*

**The procedures for organizing the meeting are as follows:**

- 1) Opening the meeting by the head of village, who will introduce the PFALUPAM team, explain about the objective and importance of the new village PFALUPAM committee that needs to be established.
- 2) The, the team leader explains about the ToR and responsibility of the village PFALUPAM committee (details in Annex 1 and 2).
- 3) The whole meeting will then propose the name of candidates, by writing their names clearly on a notice board, or screen.
  - Allow the candidates to introduce themselves to the meeting participants, and then facilitate villagers to vote by (a) writing names for each and putting into a ballot box or (b) by raising hands for suitable persons until completely selected according to number of members needed (depend on real situation of each village).
  - Then the PFALUPAM team will report on the result of the election.

After the meeting accomplished, village PFALUPAM committee member elected, the technical team will help the village administration authority to draft the official documents, which are: minutes of meeting and proposal letter to submit to the District Major, via the District Agriculture and Forestry Office, to take consideration and approval for officially establishing of village PFALUPAM committee. Examples of proposal letters and agreement of District Governor are at attachment 1 and 2. After the official letter for establishing of village PFALUPAM committee was officially approved/signed by the District Major, then the District Agriculture and Forestry Office (DAFO) has to deliver this letter to all parties concerned (one copy per each).

Before the village PFALUPAM committee starts to conduct its responsibilities and work, the head of village administrative authority has to make announcement or dissemination of the District Major's official agreement letter to all villagers to aware, understand and willing to cooperate in implementation of real activities according to the ToR of such committee established.

**1. Conditions to be a member of the village PFALUPAM committee:**

Condition or standard of candidates to be elected as member of village PFALUPAM committee, definitely must be the person who's living in village, with no limited/restricted to any ethnicity, gender, culture/belief, state of the economy and society, elders, youth, and women, agriculture and forestry volunteer, security defense, land tax etc. But, must be selected and get common election from villagers. And should consist of approximately 7-9 villager (head, deputy and members). Specific standards are as follows:

- 1) He/she must be from family who has census and living in village more than 5 years up;
- 2) He/she must be healthy person and age 18-year-old up;
- 3) He/she must have main occupation and proper to the law in the village;
- 4) He/she must have basic knowledge on village geography and situation;
- 5) He/she must have basic knowledge on agriculture and forestry development technique;
- 6) He/she must be a good person and has solidarity in community;
- 7) He/she must have modality, discipline, activity and respected by community;
- 8) He/she must interest and volunteer to be candidate and been elected.

## **2. Responsibilities of the village PFALUPAM committee:**

Responsibilities of the Village PFALUPAM committee include:

- 1) The Head is taking overall oversight to lead and supervise the implementing process of PFALUPAM according to specific ToR;
- 2) Deputy Head is as representing of the Head and working as assignment by the head on the implementation process of PFALUPAM.;
- 3) The management committee is to perform specific jobs and as assigned by the Head for specific technical work in the PFALUPAM process.

## **3. Roles of The village PFALUPAM committee:**

The village PFALUPAM committee is one of the official organisations under overall supervision of the Village administration authority, who take action as representative of villagers for:

- 1) Represent ethnicity community to protect their right and benefit related to the implementation of PFALUPAM;
- 2) Disseminate, promote and campaign ethnicity villagers to implement PFALUPAM;
- 3) Monitor and evaluate the implementation of PFALUPAM.

## **4) Rights of The village PFALUPAM committee:**

The village PFLUPAM committee take operation work under guidance of village administration authority according to democracy principles and being full ownership for implementation PFALUPAM process as:

- 1) Take lead the mass of production procedure and development of agriculture and forestry of villagers respectively and correctly to the village FLUMZ plan;
- 2) Cooperate with all concerning parties and seeking for technical and funding supports from the GoL agencies, project and investor to support on production and development of agriculture and forestry activities of ethnicity community in village according the village FLUMZ plan;
- 3) Monitor and evaluate the implementation of village FLUMZ plan, in order to protect the right and directly provided benefit of ethnicity villagers.

## **5) Duties of The village PFALUPAM committee:**

- 1) Disseminate, promote, campaign and consolidate of solidarity of ethnicity community to commonly involve in the implementation of village FLUMZ plan;
- 2) Encourage and propose to GoL organization, project and investor to organize technical and vocational training to ethnicity villagers in order to increase their skill and capability related to the implementation of village FLUMZ plan;
- 3) Provide advice, recommend and resolute constraint on labour, cultivation area and benefit occurred between ethnicity villagers themselves;
- 4) Cooperate and liaise with the village administrative authority and the village PFALUPAM committee of surrounding villages for together taking care on protection of ethnicity community right and fair benefit related to the implementation of PFALUPAM and FLUMZ of each village.

## **6. Working methods of the village PFALUPAM committee:**

- 1) Implement the principle of democracy, led by group and personal responsibility;
- 2) Work with a plan, with detailed activities, focus, goals and expectations in each period;
- 3) Activate activities on the basis of strong coordination and internal unity;

- 4) All work must be inspected, evaluated the results and disadvantages, as well as summarize the lessons learned in accordance with the actual situation, implement the reporting system and seek advice from higher levels on a regular basis

#### **Step 4: Collect data on natural resources, agro-biodiversity and potential of village:**

Collection of each data set in detail is very important in the procession of PFALUPAM approach in the village, this is to ensure the FLUMZ plan is appropriated and consisted with potential land and forest resources, respected to the needs of farmers and fitted to government strategy or socio-economic development plans that linked to reality action on production for ensuring of the food security and the sustainable ability to use the agriculture land and forest resources.

##### **1. Preparation:**

Prior to start working at target village, the team should study and collect existed information such as: P-DSEDP of the district and province from relevant offices, include the AF statistic and etc. If possible, during the implementation of PFALUPAM, should consider to mainstream or inserting of such development plans into FLUMZ. The motivation for collecting of this information is divided into 2 levels as:

- 1) Data/Information gathered from the village administration authority - or PFALUPAM committee - by interviewing to elicit basic data on general situation in the village;
- 2) Data/Information gathered from PRA focus groups of 'key informants' (together, or divided into separate groups of men and women). During these group PRA sessions, information is generated on various types of agro-biodiversity, problem census, the potential and proposals for village development.

In order to facilitate the implementation of each job, the tasks as listed in the table below must be followed:

**Table 11: Summary of tasks and approximate time:**

Data Sets and Data Form	Size	Step	Time	Target group
Data Set 1: Interview of village administration authority				
Form 1: General situation of village: village profile	A4	1	30 mins	village PFALUPAM committee
Form 2: General agro-biodiversity	A4	1	45 mins	
Form 3: Crop calendar, production inputs-costs, yields	A4	1	45 mins	
Data Set 2: PRA key informant group				Ideally 20 to 30 persons in the PRA focus group.  Ideally 50% male and 50% female.
Form 4, 4.1: NTFPS: harvest, use, sales, status, proposal	A4	1 or 2	1.5-2 hours	
Form 5, 5.1: Wood: harvest, use, sales, status, proposal	A4	1 or 2	1.5-2 hours	
Form 6: Wildlife: hunting and utilization	A4	1 or 2	1-2 hours	
Form 7: Aquatic animal and vegetable collection, status	A4	1 or 2	1-2 hours	
Form 8: Problem census, and way to resolve	A4	1 or 2	1-2 hours	
Form 9: Potential and Proposals for village development	A4	1 or 2	1-2 hours	

Before going to the target villages, the team must prepare all these Forms, and tools and equipment required in the data collection process, those consisting of: 1) all forms for data collection (see Office Tool 2) - empty forms for data recording, if funds available, empty forms 4 to 9 can be "pre-printed" on A0 sheets, for use in the PRA focus groups; 2) paper size A0, marker pens, pencil, tape, note book, chrono files, etc; and 3) computers for initial data entry, and a printer.

## 2. Collection of general information from Village Administration:

The collection of general information from the village administration, or from the village PFALUPAM committee, and especially the village economic unit, is usually one of the first tasks of the PFALUPAM team when they work in the village during field mission 1, and includes the following sets of data:

**Form 1: The Village Profile**, gives a snapshot or overview of the village, including its history and population, its agriculture land and production, and a range of other basic socio-economic data.

**Form 2: Is a Profile of the Agro-Biodiversity** includes the names of all rice variety, names of all crop and vegetables grown and in which agro-ecosystems, the period of upland rotation practice, and some basic information on forestry, NTFPs and livestock raising.

**Form 3:** Is a more specific **Profile of the Crop Production System** of the main crops in the village, listing the amount and cost of key production inputs, and resultant yields and gross margins for the average cropping family in the village.

## 3. Proceeding to collect data from users who can give information (women - men):

- 1) Explain to the village administration authority and/or the PFALUPAM committee, the objectives, and the actual tables for collecting of the different types of data.
- 2) Let the village committee select village representatives to attend the interview action. Ideally, a PRA focus group should be involved at least 20% of the total households in village, or a minimum of 15 to 20 persons, and equally represent the different ethnic groups in the village. Also, it should have about a 50/50 ratio of men and women by using of principles as below:
  - Arrange a suitable location for conducting meeting with the PRA focus group.
  - Call all the selected/target persons to assemble in the location arranged;
  - The PRA facilitator must first introduce him/herself - name, organization and responsibility - and then introduce the other team members;
  - The PRA facilitator then explains clearly to the villagers about the task on data and information collection use in the PFALUPAM process, and how it will help the GoL and development partners to target advice and assistance to villagers to develop their livelihood in the future. Explain that the PRA objective is to gain an understanding of the real situation in village, which will help all stakeholders;
  - The PRA facilitator should then use the “open question” method of enquiry e.g. how many are there, how about your thinking, what is it about? They should not use the “closed question” such as: it’s that, right? It’s like this? It’s already good? etc.,
  - The PRA facilitator must open opportunities for woman and man discuss among themselves with good atmosphere and while there may be disagreements, to avoid arguments and eventually find consensus on the data to provided;
  - If the meeting is dominated by either men or women, then the PRA must support the other gender to comment or provide data and information. In case the men provide info and data before the women, then this should be cross checked with women, to provide additional information and ideas from the woman.
  - Similarly, if the meeting is dominated by one or two very vocal persons, then the PRA facilitators must support the other participants to get involved.
  - The PRA facilitator should not focus only “questions” and give pressure to the villagers, but also maybe discuss other aspects, tell short stories or make jokes, etc, all to ensure a convivial atmosphere.



- The PRA Facilitator should not make quick conclusions after get info from only one person, but should ask more villager to provide comment to that one question, before summarizing and instructing the recording staff to record the answer/info on the A0 sheet of paper.
- The PRA Facilitator should pay attention to listen and interest to information provider until they stop talking or before their story ended.
- The PRA Facilitator should check for make sure that all participants have provided all their comments before starting to collect new information and data in other form.

❖ **Form to be used for collect the information from user group:**

Data collection forms number 4 through 9 will yield the best results from face-to-face user group interviews. In the interview, the recording form is used to inquire and facilitate the public openly, with at least 2-3 planning staff interviewing as directly as possible, the forms used are as follows:

- Form 4. Collect information on the harvest, condition and priority of NTFP;
- Form 5. Collect information on logging, use and priority timber;
- Form 6. Collect information on wildlife;
- Form 7. Collect information on aquatic animals;
- Form 8. Collect information on the census and solutions;
- Form 9. Collect information on the conditions and potential for village development.

**4) Checking of data, keying in computer system, summary and report to village:**

At the end of each day, after all interviews are finished, the team leader should re-check all data collected. If there are (a) missing data, or (b) the data appears to be illogical or not believable, then the team has to do additional interview again at next day. If all data and information look good, or OK, and correctly collected and entered into the paper record form, then the team should start, as time allows, to key in all such data and information into the computer with same forms, before leaving the village, the team should make a report, summarizing the data they have collected to give back to the village administration.

*Note: To keep of data and documents is the Responsibility of each team member.*

**Duties of the team members for recording and analyzing data (computer) are as follows:**

- Task 1. Check the accuracy of the data according to each form;
- Task 2. Check for errors in the information in the interviewed form (A4 form);
- Task 3. Explain and guide staff within the team on how to use the form;
- Task 4. Present the data to the LCD to check and edit the data as needed;
- Task 5. Compile various forms with each team of recorders;
- Task 6. Save each type of data collected into a computer (in an Excel spreadsheet);
- Task 7. Check the data and put the symbols on the information that is incomplete then give the documents back to the team for re-interviewer;
- Task 8. Compile each type of information;
- Task 9. Data analysis and interpretation to the course on issues data;
- Task 10. Report the results of the data analysis to the villager and the staff;
- Task 11. Ranking the priorities.

**Step 5: Participatory village's geographic map development:**

To start working with villager for developing the village geographic base map, firstly is to shows the special key geographical land areas where used by villagers, information on geographic include: 1) rivers and streams, 2) bbridges and cliffs 3) route, 4) location of a cave, waterfall,

location, culture and history, 5) head of irrigation, water supply, and 6) residential and other . Geographic base map developed will be used as basis to facilitate the development of plan at the next step, especially in the dialogue to uniform the inter-boundary management between villages.

### 1. Technical tool and equipment needed to develop the village geographic basis map:

The "tools " needed for developing basic geographic map generally include:

- 1) Satellite images or aerial photographs (see the 1 and 2);
- 2) TopoMap;
- 3) Transparencies sheet (to draw data on maps and satellite/aerial photo);
- 4) Pen, pencil for drawing maps (size 0.5-0.7 mm);
- 5) Stick paper used to write geographical locations;
- 6) LCD video player (LCD);
- 7) Computers and so on.

### 2. Participants:

- 1) Technical staff: should be able to create basic geographical maps of the village. Must have basic knowledge and be able to translate satellite imagery, aerial photographs and topographic maps such as land use or forest cover, rivers, roads, bridges, and symbols. There should be 2-3 staff members working in this field, one of whom must be knowledgeable and able to use GIS software to create maps;
- 2) Villagers: To work with the mapping team should have the following conditions:
  - A person who understands the condition of the area or knows the location and name of important locations in the village;
  - A person who can see and understand satellite and aerial imagery and can explain the information that appears in satellite/aerial imagery to the staff.

**Note:** Representative of the villager and village organizations who participants in mapping work should be at least 5 person or more, attend since the first days until finish and should not be absent or changed to another for replacement.

### 3. Activities for developing village geography base map:

Methods to develop the village geographic basis map are described in detail at the next section of the manual and as summarized in the table below:

**Table 8: Summary of activities for developing village geographic basis map:**

Activities	Time	Cause
<b>Activity 1: Explaining the map, satellite imagery and topographic maps to the villager</b> Provides satellite, aerial and map maps, as well as descriptions of these two types of maps, as villager may have never seen them before.	30 minutes +	
<b>Activity 2: Selecting eligible villager as individuals who can provide mapping information:</b> A person who can provide mapping information should have the following conditions: <ul style="list-style-type: none"> <li>▪ Understanding about the areas of the village that</li> <li>▪ Can read and understand about the (satellite imagery, aerial maps profile)</li> </ul>	30 minutes +	This work is usually done on the first day of work at village
<b>Activity 3: Start drawing a boundary line with the villager</b> The Start drawing the road, river, mountains and other critical points on the satellite maps and images of topography. At the same time, staff should ask villager who can provide mapping information: <ul style="list-style-type: none"> <li>▪ Names of rivers, streams, the hills, bridges, cliffs, roads and other important locations.</li> <li>▪ Names and locations of concessions or plantations.</li> </ul>	Half day	

Activities	Time	Cause
After the name and geographical location can be identified, the staff writes the name on another piece of paper map.		
<b>Activity 4: Survey the field to check and improve the geographical information</b> <ul style="list-style-type: none"> <li>The team and the villager surveyed the field, to check the accuracy of the information obtained from the map and inquired from the villager.</li> <li>During the field trip, additional data may be collected or verified for inaccuracies by using GPS to capture coordinates.</li> </ul> <b>Note:</b> This activity can be done along with the time to survey the village boundaries	1 - 2 days	
<b>Activity 5: Compilation of information from meetings and seminars to improve the geographical map</b> <ul style="list-style-type: none"> <li>The technical team collected all the information obtained from the field survey and updated it into a basic geographical map of the village (updated at the office or at the village office).</li> </ul>	Half day	
<b>Activity 6:</b> Meet with village organizations and villager <u>to discuss the</u> results of the initial village mapping.	1 hour	
<b>Total:</b>	<b>2+ days</b>	

### Activity 1: Introduce villagers to known the satellite imagery/aerial photo and topo-map:

Mapping team together with villagers choose the working place with light enough. Hang on the satellite images or aerial map and topo map (size A0 or A1) on suitable wall and correctly to village direction in order to make villager understand clearly before they work on mapping development with the team. Detailed steps to introduce the maps are as follow:

- 1) Ask the villagers “what is a satellite imagery map” and “how do we get it?”. Then the staff will then explain this to the villagers, and also inform the villagers about the exact date on which the satellite image was captured (which should be recorded on the image).
- 2) Then explain the different colours that existed on satellite imagery map or aerial photographic map, and how they represent different land use and forest, rocks and grasslands, housing or built up areas, etc.

**Figure 1. To explain the maps to villager - Starting by a geographical map of the village:**



Mapping and satellite imagery before working with villager



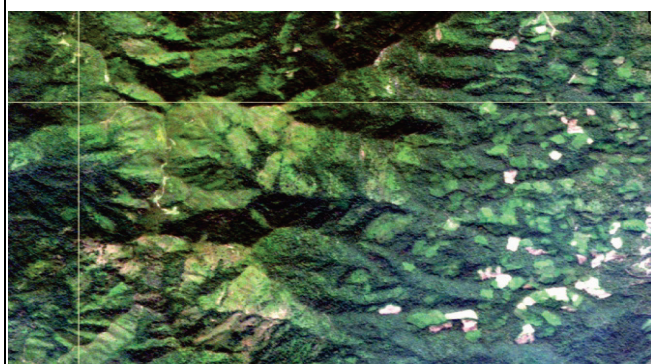


Explain the details of the satellite imagery to a group of villagers working together

**Figure 5: Example of satellite/aerial imagery map (no data available) used to create a geographic map of the village:**



Satellite imagery: Photos ALOS, resolution? M



Map imagery Satellite: RE, Resolution: M



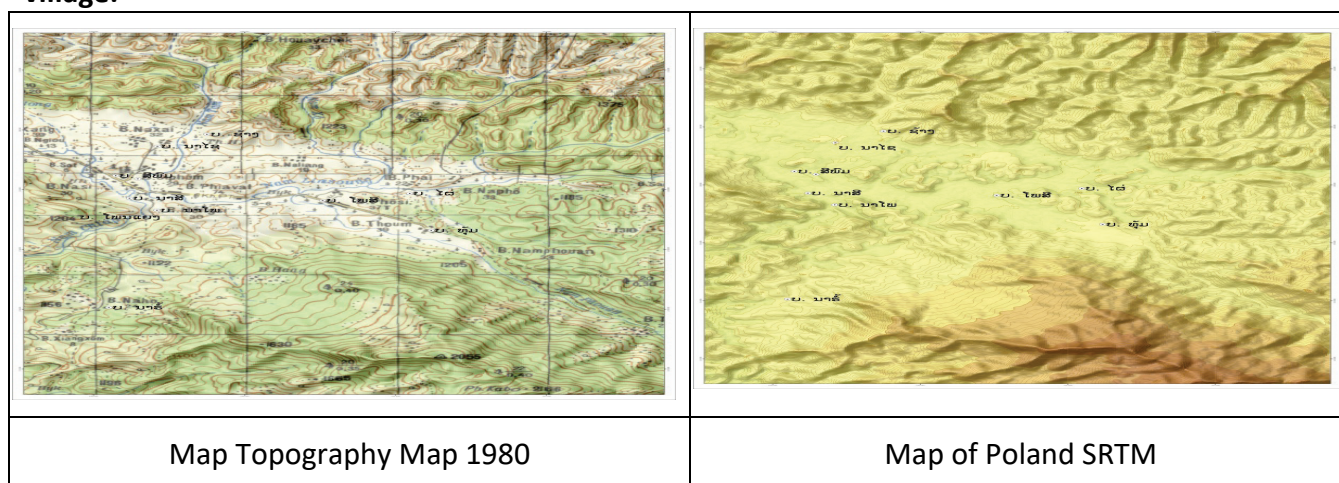
Spot6 satellite imagery map, resolution: 1.5 meters



Aerial photography, 0.5 m resolution



**Figure 6: Example of a topographic map (no data available) used to create a geographic map of a village:**



**Activity 2: Select standard villagers who are able to provide information on the maps:**

Suitable standard of villagers who will work with the team must selecting who are interested, understand, know the area of the village on the map, such as the name and location of the mountain, bridge, river, road, land use conditions in the village at least 3 villagers. After selecting the villagers, the team has to explain the details of the geographical map and the satellite image or aerial photos to the villagers.

**Activity 3: Start the process to creating a basic geographic map of the village with villagers:**

Technical team working together with villagers to enter and key location of the village on a map which includes the following steps:


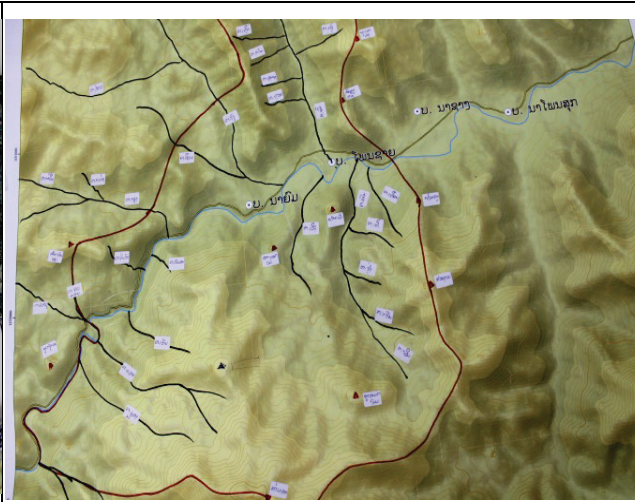
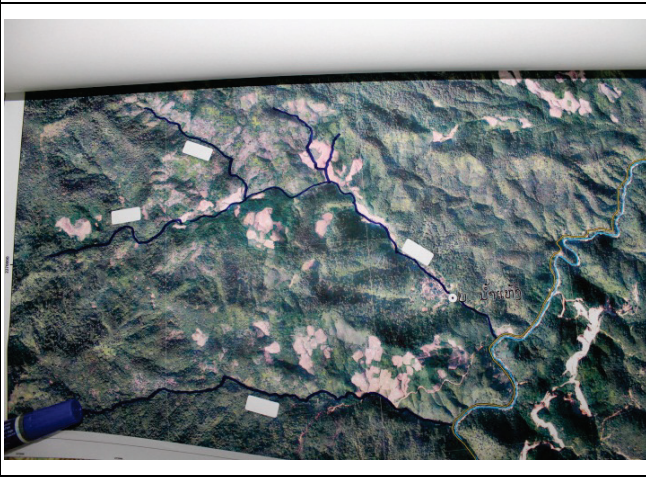
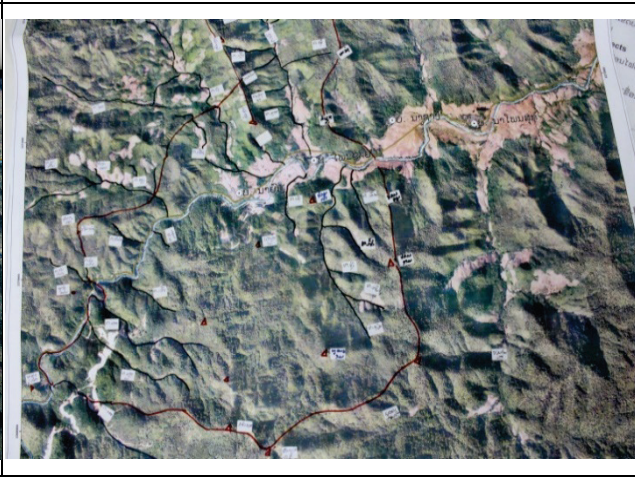
- 1: Mark the location of the village housing area, and write the name of stick label.
- 2: Then start to draw in the main road and tracks in the village - but no need to name these.
- 3: Then, continue to draw in, and mark and identify all the rivers and streams. The river/stream network may be pre-digitized, but if not then the staff progressively draw in the alignment of the river (with a big blue pen), and as each river or stream is drawn, then villagers are asked to name the river or stream – and this name is written on the stick label affixed to the maps.
- 4: Next the mountain ranges and names of mountain peaks must be identified on the maps, and the names written on the maps. As the map is now beginning to be populated by these geo features, the villagers are asked to name other geo-features, or key infrastructure such as: caves, waterfall, cliff and other well-known locations for the villagers, headworks of water-gravity pipeline system, headworks of irrigation canal system, maybe high voltage electricity transmission line, etc .

**Note:**

- *Delineating the basic geographical information, e.g. streams, mountain, special key features requires application of both the “satellite image” and the “topographic maps” in parallel, because sometimes it can be difficult to see on the satellite imagery but can be visible on topographic map, or the villages are more familiar, initially, with the top maps;*
- *Interview the data points that geography should start from a location close to village then to a location far out, or from the point of well known, or from left to right, or top to bottom;*

- Once river lines are delineated, ask the villagers about the type of rivers. If possible, the villagers need to distinguish between small seasonal stream, and year-round streams (see GIS Manual). Then the information will be passed on to GIS staff for digitization and categorize a correct class for each river.
  - There may be some streams, channels that the villagers don't know their names. In that case, it's possible that the team discuss with the villagers to find the suitable names, and give the name to each of them. If there was a marsh or pond within the village, the team should ask the villagers to identify them on the map, and name them.
  - In cases where villager is unable to identify any or do not know the location of points on satellite images or topo-maps, the team has to make note and carefully make a plan to conduct real survey in the field.

**Figure 7: Drawing and naming the streams in satellite image and topography (paper map):**

	
<p><b>Start drawing lines and stick paper on each line</b></p>	<p><b>Define and write the name on each stream</b></p>
	
<p><b>Start drawing lines and stick paper on each line</b></p>	<p><b>Write the name of each stream (reference point).</b></p>

#### **Activity 4: Field Surveys to check and improve the geo feature information:**

After studying and mapping, in the village office, the information about roads, tracks, rivers, streams, mountain, bridge, mountain top and other features which the villagers can see on



the topographic maps and satellite imagery, the next activity will be to proceed with the field survey.

**The objectives and targets of the field survey are to:**

- 1) review/recheck the accuracy of information that was identified in the village meeting, and the location of these features on the imagery and top maps, should be compared with the actual location points as observed in the field. If there were any variances, they should be modified and recorded on that imagery and topo maps.
- 2) At the same time, additional information will be collected, especially the information that not yet completed or cleared enough during the office-based mapping. Then the team must plan and prepare for taking field survey with community for:
  - identifying (determining) the locations - on the topo and imagery printed at A2 or A3 that need to be surveyed;
  - preparing the form of data survey record;
  - preparing the equipment such as GPS device, camera, spare battery;
  - preparing the teams: each of which should have 3-4 members with 1-2 persons as technical staff and 1-2 villagers as the guides.

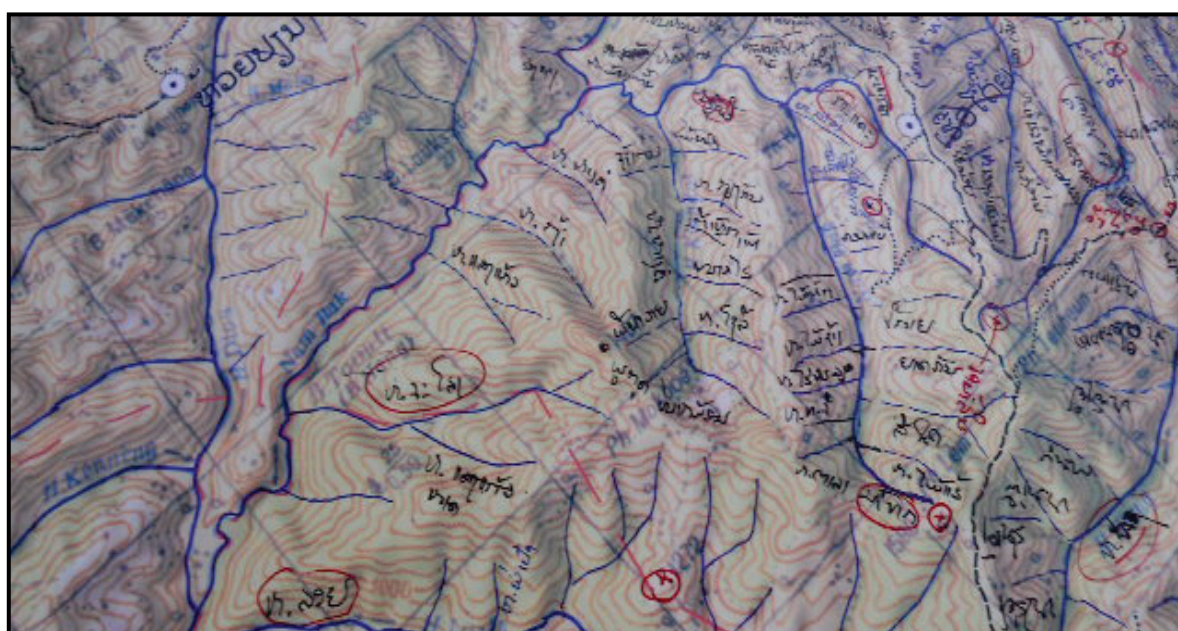
The data collected from field survey by: 1) write directly on the field map and 2) note the data on Form 17.1: inventory on significant geographical points and village boundary.

**Table 13: Table of unspecified points on the map and field surveys to be re-surveyed:**

Point or place to be surveyed	Field observation	Parallel line (X)	Longitude (Y)

*Note: Conduct field survey to check and confirm the location of the geographical points can be done along with the survey of village boundary because the mapping works on geography map and village boundary map are to do at during the 1<sup>st</sup> mission in village.*

**Figure 8: Topo maps taken and edited during field survey and work:**





**Table 14: Record of geographical location from survey:**

Village		District		Date collected:			
Kumban		Province		Collector name:			
No	Point / place name	Now the unit number (X)	Latitude (Y)	High level	Anticipation	Image number	Describe the special point situation

**Activity 5: Summary of information gathered from village meeting and field survey for updating the village basis GeoMaps:**

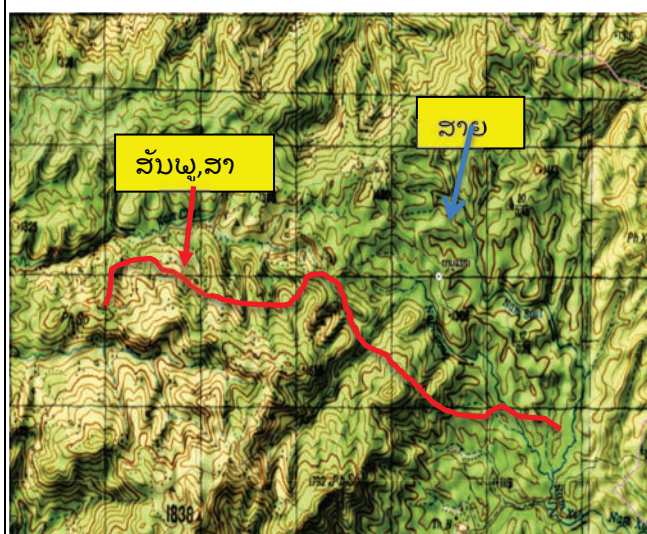
After field surveying accomplished, the new information and all data modified, including data from the GPS can be used to update the paper map and install into computer system by using the ArcMap or QGIS programs then use all these information to update the geographic map and satellite images or geography maps and download data from GPS into the GIS database.

Upon completion of inserting the geography data and the significant geographical points into the map that call the GeoMap, all results from this mission is the development of satellite imagery or aerial photos map (GeoSIM) and topo-map that consisted with completed geography info (GeoTopoNGD or GeoTopoSRTM).

**Activity 6: Present the “village geographic base map” to the Villagers:**

Presents a new version of "village geographic base map" (draft 1) to village organizations and villagers to confirm the accuracy again, if there are errors or incorrect items, the technical team of FALUPAM has to review and edit such data on a map, if necessity, must conduct re-survey in the field (generally it was conducted during the survey on village boundary management already).

**Photo 9: The Plan to promote the (Department 1980.) going into more geographic data.**



**Figure 10: Example of a TOPO map (using NASTM data from NASA) that has been added to the geographic data via GIS.**

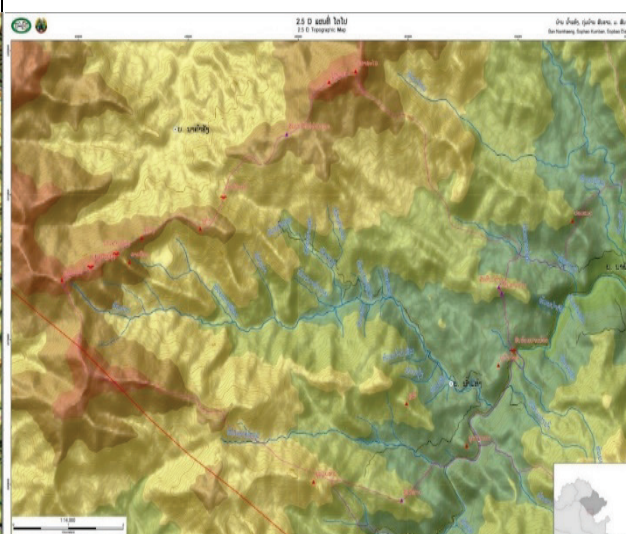
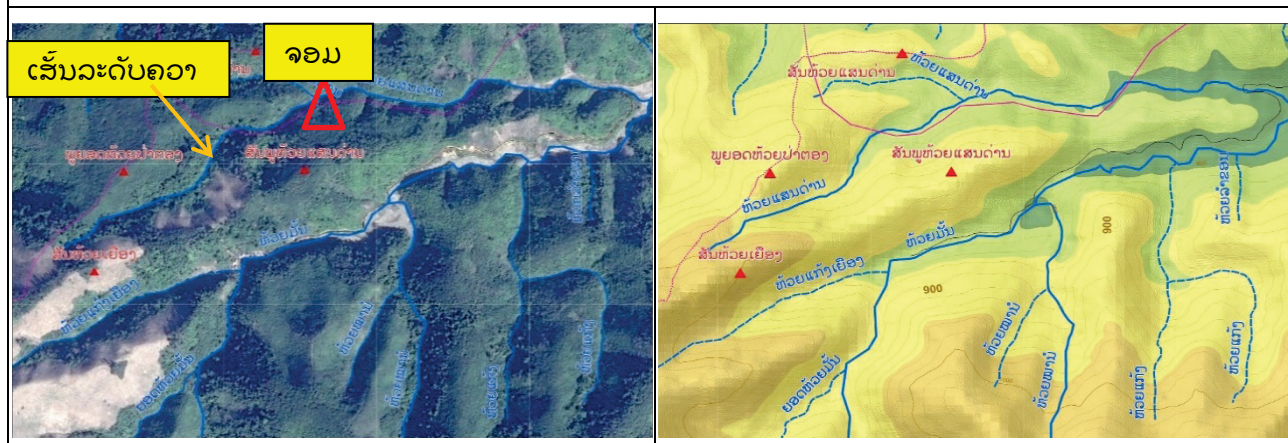


Figure 11: Example of satellite imagery and topographic maps with added geographic information



## Step 6: Develop the village boundary management map:

The demarcation of village management area (village boundaries) will be conducted after the completion of the development of village geographical basis map. The technical equipment needed for this task are the same as using for developing village geographical basis map.

### 1. Participants:

- 1) Villagers: Firstly, invite participants from target village or host village, then invite representatives from surrounding villages. Eligible representatives should meet the following conditions:
  - Same person used to work with the technical team in developing the village geographical basis map;
  - Village authority or PFALUPAM committee who can decide on make resolution to related issues occurred within the village;
  - A person who can indicate the village management area or village boundaries and the specific geographical points of the village;
  - Able to lead the staff to the site and along the corridor of the management boundaries/ connection area from village to village.
- 2) Technical staff: is the same team of whom developed the village geographic basis map in the past mission.

### 2. Summary of activities to be performed:

Table 15: Summary of activities and schedule:

No	Details of activities	Time
1	Explain till villager understand about the plans for the foundation geography	20 minutes
2	Determining the initial village management boundary line	2-3 hours
3	Discuss together with the surrounding villages to find agreement and memorandum	1> hours
4	To prepare records management areas between villages	1> hours
5	Planning to survey village management areas in some points / areas	1 hour
6	Joint village-to-village management area survey in the joint phase	1 - 2 days
7	Establishment of temporary signboards between villages	
8	Update maps and village management boundaries	2-3 hours
9	Draft and sign village management memorandum	1 hour
10	Ask the relevant parties to approve the memorandum on village management	

**Activity 1: Explanation to villagers for better understanding on the village Geo-Maps:**

In order to better define the village management boundaries, then if villagers person who join the technical team this time are new person or not the same persons who joined the previous village GeoMapping work during past time, thus the PFALUPAM technical team has to re-explain the village GeoMap to them for familiar before starting to conduct this real activity onward.

**Activity 2: Delineation of initial village boundary:**

The steps towards initial delineation of village boundary are as follows:

- 1) Collect and compile all existing records (descriptions and/or agreements) and maps of village boundary that the village has, or used in the past. If possible, the team should make copies via photocopy machine, scanner or take photos for keeping as extra filing.
- 2) If there are no previous records or maps of the village boundary, then the village committee must develop a new description of the village boundary, as they see and consider it.
- 3) As the villagers give the description of the village boundary (or based on an already existing description or agreement) then the PFALUPAM team must:
  - (a) Write down the description on a piece of paper ('inter-village boundary description');
  - (b) Locate the description on the GeoMap; and then
  - (c) Start to 'draw' lines between the points or geo features described by the villagers, ideally by use of pin and cotton thread, or with a pencil.

*Note: In the case that the village already has a map of the village boundary and/or has a village boundary agreement signed and officially approved, the team has to take that key evidence - but it must be re-checked on the map and if it is found that there is a point not correct to real situation/condition, then it must be edited and corrected. If there is a section of the boundary that is in conflict, or uncertain, then this section should be clearly marked on the map, to be checked later with surrounding village.*

**Activity 3: Meeting to discuss with surrounding villages for making common agreement and develop a memorandum on village boundaries:**

After the target village or host village has described and mapped their village boundary as they think it should be, then the team and host village must invite all surrounding villages to attend a meeting to discuss and seek consensus on the alignment of the boundary between each village as in details below:

- 1) The district team and host Village deliver invitations to surrounding villages to attend the meeting for checking together the boundary between each village.
- 2) Once the surrounding villagers' representatives arrived at the target/host village, the discussion and negotiations meeting will be opened by the head of the Village Cluster, and, if possible, the district interior office as well;
- 3) After introduction of meeting objectives by the head of village cluster organization, the host village and PFALUPAM team present the map and read the text (descriptions) of inter-village boundary that the host village and the technical team have drafted.
- 4) Then, there is an open discussion between all village representatives include the host and surrounding villages to review the description of the village boundary, between each village, one by one.
- 5) In the case that the host village and 1 or more surrounding villages can easily agree on the village boundary description and map, as proposed by the host village, then the draft inter-village boundary agreement can be drafted

- 6) In the case that the host village and a surrounding village considers there are sections that need to be revised and changed, then the PFALUPAM team has to correct the lines of village boundary in the maps and in the computers as well, as agreed to by the two villages; and to correct the record of the 'inter-village boundary description' which will later be inserted into a formal document
- 7) In the case that 2 villages cannot agree – that there are the points or sections of the inter-village boundary could not be agreed upon during the meeting, for the reason: (a) not yet clear enough on the map, or (b) the exact boundary line is under dispute, and not agreed to - then these points or sections must be noted and marked on the map for further checking during field survey.

*Note: In case of both villages could not come to an agreement on their village boundary (even that was already checked at field from surveyed), the head of village cluster and district interior office should make more attempt to present other various options and suitable reasons to making resolution and common agreement among those two villages. But, if they still could not agree upon about, the technical team has to take internal discussion to report to the District Interior Office and/or Governor for making further consideration and final decision. In case of those two villages were located in different two districts, the district governor office has to take cooperation works with all concerned organizations for making suitable resolution.*

#### **Activity 4: Start to draft the “village boundary agreement”**

If the target/host village and one or more surrounding villages can agree fully 100% on the boundaries between their villages, then the “inter-village boundary agreement” document could be ready to start to draft on, based on the format form.

#### **Activity 5: Planning to undertake field survey at selected sites of village boundaries:**

A field survey on village boundary has to be done, even if all the villages agree on the boundaries at the meeting, it is to check if the maps are correct and able to get additional GPS indication points to put in the map e.g. the sites that has not any specific natural geographic for remarkable. The plan for taking field survey must be done as follows:

##### **1) Prepare the maps and route plan for survey:**

- Before conducting the field survey, the mapping team has to determine the points and sections of village boundary to be surveyed then note on map and book.
- Then, prepare the maps to be taken on the field survey, which will be village GeoSIM and GeoTopo maps, of size A2 or A3.
- The staff then organize a meeting with all members of the survey team (staff and villagers-guides) to explain, by using the maps, the sites and locations to be surveyed.

##### **2) Preparing of field equipment:**

**Table 9: Important equipment for field survey:**

Name of survey equipment	Number	Headache	Cause
Combine GPS / Form Complete	1	Machine	With a deviation of 3 m or less
Basic map with satellite imagery, A3 background	1	Sheets / Teams	Draw / weave survey points
Writing supplies and tools			

- 3) Organize the division of the survey team: Members of the team to do field survey could include:
- Village PFALUPAM representatives from hosting village and surrounding villages.
  - Head or deputy head of cluster villages.
  - Staff from the District Agriculture and Forestry Office (DAFO) (who can use GPS).
  - Staff from the District Land Office (DLO).
  - Staff from the District Interior Office (DIO).

In general, the field survey team would be divided into 2-3 sub-teams, to go to different sites of the village boundary, each team will have 1-2 staff, and villagers from both conflicted villages should also go with each team. Times consumable for each field survey must be about 1-3 days depended of the long or short routes, large or small areas, easy or difficult accessibility and near or far away sites.

**Activity 6: Conduct of the field survey on the village boundary together:**

- 1) **Using the field maps – GeoSIM and GeoTopo:** When reaching the survey point, the team and the villager observed and inspected the area of the village boundary, then used a GPS device to capture the coordinates and then positioned it on the field map also mark in the boundary line that is agreed by members of the field survey. Do not use pen for writing data directly on the map, at first time writing should use pencil that can be erased for writing as first draft, then use the pen for writing after all has been agreed;
- 2) **Use of form for recording of GPS data:** Record the coordinate point, every time, in the form 16.2 (form to record the coordinate points of village boundary);
- 3) Because of the form will be used as evidence, and for long term use, therefore the writing should be clear and easy to read;
- 4) After finishing the field survey, the survey team has to re-check all data recorded again one more time before submit to the team responsible on GIS together with the GPS unit.

**Activity 7: Posting the temporary village boundary signboards between villages:**

If the village boundary is easily agreed to between two villages, then during the field survey, the teams can a post temporary sign boards at appropriate sites or often visited places on the boundary between the host village and neighbouring village, which is often on the road between the two villages.

**Activity 8: Update of maps and descriptor of village boundary:**

- 1) After the completion of field survey, all data e.g. GPS point readings, description of the GPS point or sections of the boundary, or any other findings as agreed to between the two village representatives on the field survey team are then used to improve and update the village boundary line on the draft village boundary GeoMap – paper map.
- 2) If the field survey team also finds that Geo features on the GeoMap are not quite correct, or are missing, then these are corrected or added to the draft village boundary GeoMap.
- 3) At the same time the 'inter-village boundary description' must be corrected and/or updated based on the field survey.
- 4) Then all of the data gained and the GPS reading must be provided to the GIS team for storing into computer by using a GIS program.

**Note:** *The village boundary map should, if possible, be developed not only as a paper map, but also by using a computer GIS program, while still in the village. The reason for developing the map by using of GIS program computer in the village is because of when the GIS team has any question or found that any data was not yet clear enough, so they can then easily ask the villagers or the staff to clarify, or check. Also, A GIS maps can be*



*easily presented - via an LCD screen - to the village meeting to conclude the work on developing of village boundary map.*

*To add the name of village boundary map, when after inserted the village boundary lines into the geography and topo maps, so these maps become as village boundary maps and call as : (1) satellite imagery/aerial maps that consisted of geography data and village boundary scope (GeoSIMVB ) and (2 ) topo maps that consisted of geography data and village boundary scope ( GeoTopoVB ).*

**Activity 9: Draft and sign the official village boundary agreements:**

In order to legally document the boundary between two village, the “Agreement on Inter-villages boundary” document must be drafted (see Annex 1 for Proforma of this document), which consists of the description of inter-villages boundary. When the description of inter-village boundary is drafted, it must be read out to participants from two villages (host and surrounding village) for final revision and editing with common understanding and agreement prior to sign and use for certification (at least make it in 6 copies for deliver 1 copy to each village and other 1 copy to each related offices).

**Activity 10: Request relevant authorities to approve and endorse of village boundary MOU:**

After the inter-village boundary agreement document is signed by each village head, then the PFALUPAM team must take this document (1 document for each village surrounding the target village) to the relevant district agencies to approve, and these are: District Natural Resources and Environment Office, District Agriculture and Forestry Office, District Interior Office. After these agencies have approved the inter-village boundary agreement, then it is passed to the District Governor for approval. Then, the 3 original copies are distributed to: 1 copy to the host village, 1 copy to surrounding village, 1 copy to the District Interior Office, while DAFO and DONRE will maintain PDF and photocopies of these village boundary agreements also.

## Stage 3: Current land use and forest cover mapping and soil fertility analysis (field mission 2):

### Step 1: Current land use and forest cover mapping (CLUFC):

The study, survey and develop the current land use and forest cover map (CLUFC) is to conducting in target village (or all villages in the cluster village) during the field mission. This stage of work will use relevant data on land ownership and CLUFC situation as base for continue working correctly to the real situation of current forest and agriculture land areas.

#### 1. Preparation:

##### ❖ Material and equipment:

Before the team starts to conduct this assessment, survey and mapping of CLUFC, the necessary materials and equipment will be prepared. While the materials and equipment required for PFALUPAM are listed in Office Tool 1, those specifically required for this CLUFC mapping task include: pens for drawing on the paper map (on the GeoSIMVB and GeoTopoVB), pins for both (a) indicating the plots of upland rice cultivation ('Hai'), and (b) delineating the boundaries of various land use and forest, cotton string for joining the pins to form a borderline of an area, sticky labels, adhered to location of each field, for writing name of owner of field, and computer, GIS capable, and a GPS for field survey.

##### ❖ Preparation of maps:

There are two types of maps that need to be prepared for working with villagers to identify and classify the types of current land use and forest cover in village (CLUFC), and these are:

- The **GeoSIMVB: satellite images and/or aerial photos**, which are transformed during village mission 1 of PFALUPAM, by the adding named geo-features, and the delineation of village boundary, so are now called "GeoSimVB".
- The **GeoTopoVB: topographic maps**, which are transformed during village mission 1 of PFALUPAM, by the adding named geo-features, and the delineation of village boundary.

For this CLUFC mapping, the maps should be printed at a scale of between 1:5,000 to 1:15,000 (depended on the size of the village area - if the area is big, thus the map scale would be reduced), and printed on paper size A0 or A1. A3 or A2 maps of the same area should also be printed, to be used by the team during the conduct of field surveys.

##### ❖ Pre-digitization or pre-delineation of land use:

If the satellite image or aerial photo that is used to make the GeoSIMVB maps is high resolution (at least 1.5 m, i.e., SPOT or better), then it may be possible to identify some obvious land use types use, such a paddy land, rubber tree plantation, developing, swamps etc. In these cases, the GIS staff, or the paper mapping team, may delineate - before working with the villagers - the boundary around such land use areas, as this will reduce the time in working with villagers.

However, the field teams must still verify this identification (interpretation) and delineation with villagers, and review all such pre-digitization or pre-delineation for its correctness.

##### ❖ Specify the "date" of satellite imagery and aerial photos:

The date of the satellite/aerial imagery is very important for working on current land use and forest cover mapping process because the prepared satellite/aerial imagery may be different or old, which may confuse the villager involved when mapping together with the team. Therefore, the PFALUPAM team must inform the villager who come to

work to recognize the date of the photo in order to be able to translate the photo/create an accurate current map, which may be indicated somewhere on the map, or can contact the photo company or the source of the information.

If the date of photo existed (and the month, year), it will be able to know the spatial characteristics according to the upland farming season (for more information, see Appendix).

❖ **Preparation of the PFALUPAM team and village participants:**

- 1) The members of the **PFALUPAM** team who will work with villages on participatory mapping of CLUFC must be able to:
  - 'Read' and understand (a) topographic maps and (b) the satellite imagery and aerial photo maps.
  - That is, they should be able to identify the type of land use, rivers, roads, mountain peaks and bridges, and river valleys, and any symbols appearing on the GeoSIMVB and GeoTopoVB. So, they must have a good understanding of forest and land use ecosystems and land use systems.
  - He/she must also be a 'facilitator' - must have good communication skills in working with villagers, and able to (a) explain the GeoSIMVB and GeoTopoVB maps to villagers, and (b) facilitate and develop the villager ability to interpret the imagery, and explain this back to the staff.

The PFALUPAM mapping team members should consist of 2 to 3 persons: at least 1 person to work on participatory mapping, and other 2 persons to work with villagers for conducting field survey, including the use of GPS.

- 2) The villagers who will participate in this task should have the following characteristics:
  - Should understand the geography of the village, such as the names and location of rivers, streams, mountains, valleys, and the situation of forest and agriculture land use in the village, and other landscape or important geographic sites and features.
  - Should be able to understand, to read and then interpret the GeoSIMVB and the GeoTopoVB, especially the forest and agricultural landscape and land use, and able to explain this back to the staff.

**Note:**

- *initially, there may not be many villagers who can 'read' and understand the maps, especially the satellite imagery and aerial photos. Thus, the PFALUPAM staff must take time to explain, and after some time many villages start to understand the imagery.*
- *Similarly, the villagers may be more familiar with the NGD topo, rather than the SRTM topo, so this is always used as a back-up, even though it is very old, and not very detailed (and sometimes wrong).*
- *The number of villagers who participate in this would be a minimum of 2 to 3 person for paper mapping and 3 to 5 person for field survey, but in reality, many villagers can participate as they have time. The villager team should include the elders of the village.*



### **3) Explaining tasks, plan of works and methodology to team members:**

Before working with villagers, the PFALUPAM team leader has to explain the work plan and methodologies to team members, then allocate of specific work and responsibility to each member in order to avoid confusion when conducting the works with villagers

## **2. Main tasks:**

### **Task 1: Starting to work with villagers:**

#### **1) Introduce team members and explain GeoMaps to villagers:**

Firstly, the PFALUPAM team leader should explain to the villagers the objective, reason and importance of the work to develop the maps and data on current forest and agriculture land use.

Then the team leader, or the participatory mapping staff, must explain to the villagers the GeoSIMVB and GeoTopoVB maps that were developed initially with the villagers, in village mission 1, and then transformed by GIS staff into GeoSIMVB and GeoTopoVB. Then, allow the villagers to ask any questions about the maps, to point out missing information or to clarify any misunderstanding.

#### **2) Explain the task for developing of current agriculture land use forest cover map (CLUFC):**

The PFALUPAM team leader then explains the process and methodology for the assessment and development of current agriculture land use and forest cover map. The team must inform the villager that they have an important role to take in collecting information, providing assistance, and demarcating/drawing up current agriculture land use and forest cover areas within their village.

### **Task 2: Identify and determine the forest land area:**

Identification and mapping of " forest land " is very difficult, especially in the highland. Due to the forest land that appears on the satellite/aerial imagery is very close to the fallow area. To avoid such errors there are ways to consider by:

- 1) Based on the knowledge and understanding of the villager's own geographical area;
- 2) Based on the ability of villager to understand and translate satellite imagery maps and topographic maps;
- 3) Do not try to start with the drawing of "land fallow" directly, as it may be wrong, the team advised villager to default/draw extent of forest land that had been cleared for agricultural production in the period 15-20 years.

### **Task 3: Identify and determine the forest land type within the village:**

Maps of satellite imagery should be laid on the table, the room is light enough or may be placed outside the room, then staff should let villager know about the months and seasons shown on satellite imagery, the information can help villager understand and translate photos more particular. types (species) of forest.

- 1) In the case of satellite imagery taken during the rainy season or early dry season, all types of forest will be green, which makes such distinction even more difficult;
- 2) If the satellite imagery is taken between mid and late dry season, some trees will begin to lose their leaves so that the " deciduous forest " will not appear green;

- 3) In the case of satellite imagery taken between February and April, this is the period when villager prepare the area for production, so the area will be clearly visible in the satellite imagery, which is very technically useful in deciding which forest area has never been cleared before.

The staff then asked the villager about each type of forest land available within the village or throughout the village landscape. Villager should be given the opportunity to discuss with each other. In some cases, villager may want to look at satellite imagery to be able to describe each area of forest land and be able to tell the team each type of forest land within the village.

After the team and the villager can agree on the type of forest land, the team must record that information. Villager should also be provided with descriptions of non-timber forest products available in each type of forest.

While villager is describing about the forest in the village, the team should record the information as villagers described, and the team make compare to the kind of standard forest in the system colors. The classification table for each forest land type can be revised after the staff and villager have deeper understanding of each forest type in the village.

In order to make the demarcation/drawing of the forest area more effective, the team and the villager should carefully observe and translate the photography photos. The best way is to start from the top left to the bottom right of the map and at the same time draw the forest area found on the map.

After completing the mapping of forest areas throughout the village on a satellite imagery map, the team should provide opportunity to villagers to review the designation of each forest land area and then inquire about each type of forest according to the villager's report.

#### **Task 4: Identify and determine the area of fixed agricultural land:**

- 1) First of all, the team must explain to the villager to understand how to read or flat map satellite imagery to identify areas of such forest areas, fields, farm, upland, garden and industrial plants. The team must also advise villager on the photos because the characters use in the images taken depends on the season of the images were taken ;
- 2) Then ask villager about the status of each type of fixed agricultural land and how many types they can see on a satellite map, then give them a chance to discuss so that they can explain and identify all types of fixed agricultural land in the village (Appendix table).
  - Then the technicians and the villager work together to draw/define the fixed agricultural plots that can be seen on satellite imagery using a pen, a map or a needle and a thread;
  - At the same time, the technician should write the name of each “land use type” on the sticker and put it on the map (writing the name of each type of land use can use the local name or official name from the land use type table, see appendix)
  - The villager, with the help of the team, continue to study the map in consultation with each other, then determine the remaining agricultural land use areas at other stages until completion.

❖ **Compare the map with the data collected in form 2 and 14:**

During this process, the technical team may bring the information collected from forms 2 and 14 to the public for review as follows:

- 1) Form 2: The village authorities report on all crop species grown in village, so check on the map that can cultivate or not. If possible, see all cropland;
- 2) Form 14: Each household reports the main crop species grown in their land use or occupy, so this information must be reviewed with the CLUFC map for reality or accuracy.

❖ **Ability to identify each type of land use area based on the resolution of the image:**

The "resolution" of satellite or aerial image is an important factor in the identification and identification of land use areas. The resolution of each type of image is:

- 1) If the resolution of satellite/aerial imagery is 5m or higher (sentinel or Landsat), it is not possible to distinguish (i) the type of fixed agricultural land and (ii) the difference between forest and fallow lands;
- 2) If resolution satellite/aerial imagery is between 2.5 - 5m (Rapid Eye), are not able to distinguish the type of agricultural land stable or forest land as that was;
- 3) If the resolution of the satellite/aerial image is between 1.5 - 2.5m, it will be able to identify all types of fixed agricultural land and can also clearly identify forest land;
- 4) If resolution satellite/aerial imagery is between 0.4 - 1m is able to identify all types of agricultural land remained thoroughly and accurately and can also identify the agricultural level individual/family.

**Task 5: Identify and determine the industrial tree plantation areas:**

If the SI or AP have good enough resolution, the PFALUPAM team - and the villagers who have knowledge of timber tree plantations in their village - must scan the GeoSIMVB to identify and then delineate those areas in which timber trees.

As these are identified on the GeoSIMVB, they should be demarcated by pen or pin + cotton thread and notes written (on sticky paper) with the type of crop, name of owner, and other information on the map.

Then, each significant area of timber tree plantations should be recorded in table (see table 6 below) which records not only whom the plantation belongs to but whether it is a local, or a non-local individual, a local or non-local company, or it is a land concession.

**Task 6: Identify and determine the upland crop fields:**

The team should explain that the reason to understand and map upland field location, and the management of the upland landscape, is to help in the development of upland cropping systems and land use plans which are both productive and acceptable to the government. Thus, the team needs to know, for example:

- 1) Upland cropping areas as one large village group, as several groups; or
- 2) Do they prefer to use the land as individual households, scattered throughout the landscape (see figure 8 for examples of these system)?

Sometimes in this task, there are two general, sometime parallel activities to be undertaken as: 1) the general identification and mapping of upland fields, or zones of upland fields, for the for the season as seen on the GeoSIMVB, and 2) the identification, by each household, of their own upland fields, and the marking and naming of these fields in the SIM, as household plots.

❖ **Identify, determine and demarcating upland fields on the SIM:**

The PFALUPAM staff and villagers must scan the GeoSIMVB, and identify the upland fields as seen on the image, and decide what year/season the upland fields were cropped. By understanding the month of capture of the image we can understand which season the upland fields were cropped.

Then the PFALUPAM staff ask villagers which crops they grow in the upland fields that can be seen in the image. The crops will generally be either rice, maize, or sometimes jobs tears, and, less commonly, sesame or cassava, but also other crops.

The staff then ask about the number years the village likes to leave the land fallow, for bush fallow to regenerate, before they return to the same area to crop again (and this will be cross checked Form 2). Conversely, how many years do they crop the same piece of land before leaving it to rest

Then when the staff and villages are familiar and sure about the 'figure' of upland fields on the GeoSIMVB, then demarcate each plot, or groups of plots, as polygons, on the paper map – usually with a mapping pen. They then continue to demarcate all the upland field plots/zones in the village area, until finished all.

❖ **Approximate location of each households' upland fields on the GeoSIMVB:**

The next level of detail in mapping upland crop fields is assignment of an owner or user to each plot, and this is done in coordination with the household data collection team, whose work is described in Tool 2.1. So, after each household has been interviewed and filled-in data to Form 12 (household land use and tenure) of each villager/household then joins the mapping team to indicate, on the paper map, the location of their upland fields.

This is easiest, of course, for those fields that are seen on the Satellite Image, but it can also be done for the previous year's upland fields which would appear as very young fallow on the images.

- 1) For upland fields of the year of GeoSIMVB, ask each villager/household to indicate the site of his/her upland field, and then staff affix a 'Pin', or a 'stick label' on that field, and write on the pin/sticker either: the name of that household, or the household number/code in form 12 (see photos Figure 8 below).
- 2) For the location of upland fields not shown on the GeoSIMVB - but that can be located by the villagers because they understand the maps, different coloured pins can be used: yellow pin for location upland fields of the season (clearly seen on) of the GeoSIMVB; red pin for location of upland fields in the year/season before the SIM; blue pin for location of fields (planned) for the season after the GeoSIMVB.
- 3) If multiple crop types are grown in the uplands in a particular village e.g. both rice and maize, or jobs tears, then it is too complicated to map the location of fields in multiple years for multiple crops. So, only the location in the year of the GeoSIMVB is mapped, and the coloured pins can be used to indicate the location of the different crops, for example: yellow pin for upland rice; red pin for maize; and blue pin for jobs tears, etc.

*Note:*

- *this activity of 'marking the location of upland fields' is undertaken mainly in villages with significant upland fields, because this land use is the most difficult to map and take into consideration in the final land use planning/zoning. This method could also be used to locate fixed agricultural land plots, but this may not be necessary...except if the intention*

*is to map in detail all household plots, as a precursor to the development of meaningful, accurate, “household land registration book”, and eventually land titling;*

- *This ‘marking location of each households upland plots’ is not necessary if the village community already manages and crops their upland landscape as one large zone, i.e., not scattered over the landscape - unless the village specifically requests assistance to allocate land to each household, within the larger upland crop zone, on an annual basis.*

❖ **OPTION: Detailed mapping of each land plot of all households:**

Emphasizing on study, determination, mapping and planning on village forest and agriculture management zone are to be defined clearly on current land use of the families. If there is a satellite images or photos aerial with high resolution 0.5 meters or better, determining and mapping at household level can be used as base for developing the agricultural census, which is subject to registration of land use and issuance of land titling in future. The additional optional jobs will include as below:

- **Check and verify land use data with each household:**

The PFALUPAM team meets each household or land user, one by one, to update and detail the information on form 14 (Village household land registry). This data is immediately uploaded into the computer form 12. The PFALUPAM data staff then print out a 1-page “household land list”, from form 12, for each household to take with them to the paper mapping teams.

- **Review and verify each household's land use information:**

Owner of the land specified plot in the map satellite imagery resolution, as can be identified, the staff and drawing each plot on a paper, then enter the data from the form 14, which is the only include numbers units, village number, number of plot, type of land use (or plant) and the land use right document.

- **Conduct a field survey to verify and improve the land use area of each family:**

Field inspection is needed to clarify an accuracy of each family plot of land that was initially mapped in the office section. Because, the collecting of data on land use of family needs more precise resolution, the map used in the field inspection should be the ratio of (large scale map). In addition, the team must prepare a survey map that is appropriate and easy to use. During the survey, technical staff and the family should: 1) check the demarcation of each family plot drawn on the satellite imagery map and edit if necessary, and 2) capture the GPS plot of the plot that cannot be drawn on the satellite imagery map.

- **Corrections the map and form 14 as final database:**

After completing the field survey and back to village each day, the staff should: 1) update each plot (based on the results of the survey field) on a paper authentic, and 2) update to the form 14 and 3) get data GP Ed (GPS) from survey to the staff responsible on mapping.

The mapping staff should then mark the plot boundaries of each family on the computer (GIS system) to be more accurate, then the team can use this information to create a complete map and showing the family plot of land at the village level meeting (but not yet completed the land survey).

**Task 7: Check agriculture land data against “household land census book”:**

If the village, or households, already have a land registration record or book, issued either by the DONRE, or DALAM, then the PFALUPAM staff should cross-check the numbers and areas of land plots recorded in village/household land registration book, by comparing it to the data from (1) form 12, and (2) the CLUFC map being developed.

If there is any difference between the land types and areas, then these should be discussed among the PFALUPAM team and the villagers to assess which is the most accurate and up to date. In most, if not all cases, the data coming from this PFALUPAM method is more accurate and/or more up to date. Also, this PFALUPAM process will lead, eventually, to a more accurate village and/or household land registry.

**Task 8: Study and mapping on other types of land uses/areas:**

After identifying and drawing land use maps, which included: 1) undeveloped forest area, 2) permanent agricultural land, 3) upland agricultural land, 4) crop and industrial tree areas, and 5) grazing land area, then the PFALUPAM team continued ask villager on other land use as can be seen in the land use maps. Provide opportunities for villagers to discuss with each other, as well as guide them to use satellite imagery map so that they can point out other types of land use areas within the village.

The color code for other types of land in the current color value system is shown in the appendix (note: if other land use type is found or is not on the land use chart, the team can notify or inform the staff in charge of the GIS/GI chart)

When villager begin to identify/classify other types of land use areas, staff should begin to demarcate/draw those areas on paper map at the same time, with the names/types of land use as letters or color codes or land use type codes in each area. Once completed, the team must report/inform to the village PFALUPAM committee on all every land use type inside the village for checking again and adjust accordingly.

**Task 9: Collection additional data on “important location”:**

Most of the key location data has already been collected during the first round of implementation (basic mapping and demarcation of village boundaries), such as peaks, valleys, cliffs, and more. For the second round, the team should continue to collect data on the remaining key locations, especially those that appear during the demarcation/drawing of the current land use and forest cover (CLUFC) map.

**Task 10: Field survey:**

After - or in parallel to - the paper mapping work in the village, the PFALUPAM team and villagers have to plan for and then conduct field surveys to check and clarify the land use mapping, especially of those areas, sites, forest types and agricultural land use type that the staff are not sure about, or are not able to clearly identify or delineate on the GeoSIMVB Map.

- 1) The PFALUPAM staff summarizes all the unclear or uncertain areas or land uses that remain unresolved from the village mapping work, or areas which they consider should be verified or clarified by visual observation in the field.
- 2) The staff mark the areas requiring field survey, firstly on the A0 GeoSIMVB, and then on the field survey maps, which are generally A3 (or maybe A2) size GeoSIMVB and GeoTopoVB.

- 3) Then the staff and villagers make the field survey plan, generally on a daily basis, which will include (i) indicating areas to be surveyed, (ii) the survey teams, and (iii) the best way to reach the areas needed to be surveyed - on foot or by vehicle.
- 4) Usually 1 to 2 teams will conduct the survey on the day, and each team normally consists of 1-2 technical staff and 2-3 villagers
- 5) The equipment to be prepared includes: back pack, with water bottle, and writing board/folder; GPS (set-up, battery, clean-out old existed data); form No. 17.2 to record the GPS and site descriptions; GeoSIMVB and GeoTopoVB map, size A3 or maybe A2; Pen/pencil for mapping and recording field data; supporting-board for write during field survey; digital camera or mobile phone with GPS/Compass App.

During implementation of field survey, the staff record their observations by: taking GPS readings, and insert into form 17.3 (see Office Tool 2); making notes on observations, to supplement GPS readings, also in form 17.2; and making notes on the map.

**Task 11: Update and revise the paper CLUFC maps based on field survey:**

After the field survey and the teams arrived back to village, they have to explain what they seen, with reference to the maps; and provide GPS points, and locate these on the paper maps - as much as possible.

**Task 12: Insert the data from GPS and paper map into the GIS system:**

After complete specifications and drawing the areas by using of current CLUFC on the map paper, the technical responsible on GIS can start to record all the areas in the GIS system based on the scope of the village (details see manual PFALUPAM GIS ) The display in GIS system can also be compared between new data collected with satellite imagery and geographic information available.

Also, the GIS staff should record all other necessity information needed on the GIS system e.g. information on upland cropping area should record the owner (if any), crop species and year of plantation. For other important location should also record of their name too.

GIS system staff should perform this task while still staying in target village as because if there are errors found or data corrupted, so it can be solving in village.

Finally, the GIS technical officer will re-examine all data to avoid inaccuracies of current land use data and CLUFC forest coverage. Then calculate the initial area to be able to check whether the information is accurate or not. The results of this map can be displayed for villagers to see again before leave the target village.

**Step 2: Collection of family level data:**

- 1) Firstly, the staff must collect the name of each household in each unit or khum of the village from the Village Administration Committee, as it is usually easier to organize the households based on the village units/khums;
- 2) Then the village administration committee will call or make an appointment for each household in a unit, to go to the village meeting room for the interview;
- 3) The team briefs and informs the target family on data collection, briefing the informant's family on the data to be collected and the process to be used in the future.



**Kindness:**

- Open opportunity to villagers to make concerning questions and the team should explain information to the obvious;
- Create an environment where villager feel comfortable, safe and free to tell the truth;
- Do not ask questions to only specific person but try to get everyone involved in providing information;
- Use language or words that are easy or not a technical word too (may need assistant facilitation on local language, if necessary);
- Representative of the team expressed sincere thanks to the informants after finished the completion of data collection.

**In collecting family level data, if it is during the production season/period, the staff must interview in the evening or depending on the actual situation of each family.**

❖ **Family information collection form:**

The team includes staff planning at least 2-3 person to conduct interview and record the household level data by openly facilitating villagers and ask exact questions to match the point. The forms to be used are:

Form 12. Collect information on the population, food needs and household livestock;

Form 13. Collect information on household income information; and

Form 14. Collect information on family land tenure, possession and use.

**Step 3: Survey and collect soil samples in the village agricultural area:**

The survey and collection of soil sample in the field is one of necessity and important task that related to the assessment of the appropriate land for crop cultivation which is basic data on soil science that can be applied to the planning for using of agricultural and forestry land that means to manage and develop the forest and agricultural land suitable to the physical potential and conditioning each specific area and aiming to sustainable use of land with high benefit in return. The survey and collect soil samples at the field ground are: 1) detailed survey and soil collection, and 2) surveys and soil analysis by using "Soil Test Kit" tools, as bellows:

**1. Detailed soil survey and sampling:**

Survey and collection of soil samples activity has 2 types as: 1) hole land base (Profile) size of the hole wide about 80 cm, length 150 cm, depth 120 - 150cm each hole to record images of soil, crossed stratified soil, observe and record the phenomenon that is found in soil and soil samples of soil found in the landing pit between 2-5 samples per hole (depending on the characteristics of the landing pit) in research and 2) hole soil States (Auger) using the tool to the depth of about 120-150cm on average about 4-5 holes in one inspection hole land base in order to find the distribution of difference type of land, then record characteristic figure of soil and should keep at least 1-2 samples from a depth of between 10 to 50cm for further analyses on the land division scope and the fertility of the soil.

**2. Soil survey and analysis using Soil Test Kit:**

Spreading or sampling soils scattered throughout the area, the more frequent the sampling, the better the soil sampling (details are specific)

#### **Step 4: Compilation, analysis of socio-economic data and maps:**

After the collection of data on agro-biodiversity, socio-economy and land, and the completion of the CLUFC mapping, during PFALUPAM missions 1 and 2, the next tasks are to clean, compile and analyse the data and information, so it can be used during the next steps in PFALUPAM which is the forest and agricultural land management zonation plan and implementation.

##### **1. Compile and analyze GIS data:**

The goal of consolidation and data analysis is to : 1) ensure that data collection and record form 1 - 14 are entered into computer database properly clear, if incorrect or unclear so check with what see in the form collected from the field , 2) compile and analyze data each line, and 3) compare land use information in form 14 and CLUFC.

##### **2. Summarise and analysis of general village data (Profile):**

The data is collected from interview the village administrative authorities and eldest of village and recorded in the form 1: general data of village during the implementation of PFALUPAM process, if it was found that the data is not yet fully correct, thus it should make additional collection of data again for inserting in the improved form 1.

##### **3. Summarise and analysis of “previous land use planning developed”**

The information on previous LUP as recorded in the Village Profile is brief, such as: (1) the period of when LUP implemented; (2) who implemented, and who has the data/maps; (3) is the LUP that was done still being used or abuse? and (4) in cases of the village still using the previous LUP, thus it must be discussed and taken into account during the development of forest and land use management zoning (FLUMZ).

##### **4. Summarise and analysis of “other projects” existing in the village**

Summarize information about other projects or development activity in the past or on-going by asking questions such as: (1) name of the project, period of the project (in the past or on-going); (2) type of the project: village level or family level promotion project; (3) main activity of the project; (4) source of fund and type of fund (loan, grant, villager own fund); (5) situation of project implementation: project is still ongoing implementation or already finished and (6) output of the project and benefits to villagers and/or the community

##### **5. Summarise and analysis of Agro-biodiversity, and key economic crop:**

- 1) Staff must carefully note the names of rice cultivars as reported by the village administration, although in reality, these will most likely just be local names, not ‘officially’ recognized cultivars. Nonetheless, this information gives an understanding if the village is using indigenous cultivars or improved cultivars, and this can be for further planning of extension work. Information of “why and when” each cultivar is used, its agro-ecosystem function can be useful in zonation of agricultural land.
- 2) Crop species planted in 4 main agro-ecosystems. This section of form 2 is aimed on describing the full range of crops grown in the village, and thus the staff must carefully note the names of different crops grown in the 4 agro-ecosystems of: (1) crops planted with the upland rice for food and/or sale; (2) crops planted in uplands fields, but not with rice; (3) crops planting in wet rice fields (normally in the dry season) for food and/or sale; and (4) crops planted in gardens or other land. If the staff notice any discrepancy or unsure data, then they should go back to the original data collector to clarify.

❖ **Main problem in crop cultivation:**

Data in this section of form 2 is an brief analysis of the problems occurred in village cropping, which are analysed under 4 mains topics, as: (1) crop species adaptability - problems and potential, (2) land cultivation, planting, crop management and harvest, (3) soil quality – this can be important for FLUMZ, and (4) pests and disease.

❖ **Upland cropping:**

- 1) Duration of upland field/bush fallow rotation: This data, as entered in the table below, is a key factor in upland agricultural land use planning. Ask the following question for getting data on age or period of fallow fields rotated over 20-30 years ago, and the attitude of villager think that the rotation of land should be used and can be taken;
- 2) System of upland cropping: This section describes, briefly, the way that villagers organize and manage their upland cropping landscape. That is, do they manage and crop the land as dispersed individual families or do they crop in groups or as one large group of the whole village entity.

❖ **Preparation for annualy slashing of upland fields:**

This section tries to describe the preconditions or the considerations that the villagehods, or the whole village, use when they are seleceting the area to be slashed for upland cropping, in each year. This is also crucial for the land use planning of upland fields and bush fallow, but again the staff keying-in the information into computer database may need to interpret what the field staff have recorded in this section.

**6. Livestock management:**

This section of form 2, tries to understand the 'location' where each livestock species is mainly raised, in both the wet and dry season, and if there are any rules or regulations in regard to each species. By 'location', means the land use system in which the livestock are normally raised, not a geographical point. Thus, the staff keying-in the data must try to use standardized terms, but without changing the meaning of the information originally given by villages. This information, especially as relates to the raising of large livestock, cattle and buffalo is crucial information for the land use planning.

**7. Preliminary information on forests:**

❖ **Forest area that have never been cleared or used for agriculture:**

Understanding those areas of forests that have never been cleared for agriculture is one of the most important factors in PFALUPAM, especially for the development of forest and land use mmanagement zoning plan (FLUMZ) and thus the data needed are on:

- 1) Name of the forest area, location, category and the condition of the forest, is it pristine, slightly degraded or very degraded;
- 2) An explanation of why it is maintained, has never been cleared for agriculture, must be clearly recorded in the word file for later use in mission 3 of PFALUPAM: development of forest and land use management zoning plan (FLUMZ).

❖ **Different types of forest in the village and key products:**

This information is mainly used to help start the discussion on the value of the forest in the village, but will be supplemented later on by the more detail information in forms 4 and 5 (NTFP and tree-timber).

❖ **Bamboo forest:**

This information is used to analyse the forest mapping in the CLUFC, as it can be difficult to distinguish between (a) true forest and (b) bamboo forest and (c) bush fallow. So, this data should be used to support the CLUFC mapping.

❖ **Tree plantations or NTFPS garden:**

This information is used to help in the CLUFC mapping of current forest, and then the FLUMZ process.

**8. NTFP harvest, utilization and status:**

❖ **Summary and analysis on harvesting and use of non-forest products (NTFP) and status:**

The NTFPs data gathered in each village must firstly be keyed into the forms 4 and 4.1. Then the data is checked for completeness and a 'reality-check'. If the data seems unrealistic, then the data compiling staff must give it back to the data collection staff, to query them on the old figures.

Then the **calculations (estimations)** are checked. There are 4 calculations in form 4:

- 1) The sum of all NTFP harvests within the village (column 9 in the table below) or;
- 2) Total (estimated) village income from NTFP (column 11 in the table below); and
- 3) Totals (estimates) revenues and income from harvesting of NTFP within the village.

*Note:*

- *the data in this NTFP table 4 is not very accurate - its usefulness is more to show the relative importance of each NTFP, compared to other NTFPs in the village. Thus, the income from each NTFP may not reflect reality, but more the relative importance.*
- *Even more so, the total income from NTFPs will not be accurate - a longer, more detailed PRA session in each village would be required to get a better estimate (i.e., a 6 to 8 hours PRA session would be required, compared to the 2-3-hour session).*

After the team completes the collection, correction, compilation and analysis of NTFP data in the form 4 from every village in one cluster, it summarizes the important NTFP species at the cluster village level: (1) important NTFPs based on consumption; (2) NTFP based on income; (3) NTFP based on the income of each species, of every village in a cluster.

**Table 10: Compilation of NTFP data:**

No.	Name: Commonly used species	Name: High-income species	Value	Total Village
1				

❖ **To compile and analyze the type of endangered forest, and type that villager propose for restoration and planting:**

Technical staff must input data into forms 4.2 excels - information was collected at target village with following items:

- 1) Endangered NTFPs: Name/species, number of years extinct and cause;
- 2) Prioritize NTFPs that need to be developed through afforestation and forest management: Number of households, methods, causes;
- 3) Prioritize NTFPs through horticulture: Number of households, methods, causes.

This information will help as reference to the PFALUPAM team in the implementation of mission 3: development of forest and land use management zone (FLUMZ). Data of every

village compiled and analyzed and shown to cluster village as shown in table below, it can help in planning to promote the efficient and effective production as can be seen in each village of one cluster village.

**Table 18: Summary of NTFP species cultivated/promoted in cluster village forest:**

	Name: Non-timber forest products that village proposed to plant, rehabilitate in the forest							
Village name	Red cardamum	White cardamum	Orchid	Amboo shoot	Rattan	Tea	Galangal	Benoin

**Table 19: Summary of non-timber forest products (NTFPs) rehabilitated in the Kumban gardens:**

	Name: Non-timber forest products that village propose to plant in the garden									
Village name	Red cardamum	White cardamum	Orchid	Amboo shoot	Rattan	Tea	Galangal	Benoin		

## 9. Timber harvesting, use and status:

### ❖ Summary and analysis on consumption of timber resources and timber species:

This is especially a problem in timber tree form 5.1 and 5.2, as the harvest data is often much higher than would be expected in reality. This problem is most likely due to over- statement and recording of quantity of wood harvest per family - which often seems much higher that is practical or real.

Then review the calculation including the yield (estimation) from the use of timber. Here are the 3 calculation in form 5:

- 1) Sum of the total amount of timber harvested within the village;
- 2) Total (estimated) total village income, per tree species;
- 3) Gross (estimated) income, including harvested timber from the village.

*Note:*

- *Likewise, if the user data from Form 5.1 lacks clarity - however we can also analyze the importance of each related species. Therefore, the income from timber harvesting may not indicate the actual income but can show the benefits and values of each species.*
- *alike, the staff should discuss with PRA information staff longer time until the estimated figure is close to the reality as much as possible.*

After the team completes the collection, correction, compilation and analysis of timber harvesting data in form 5 from each village in one cluster, it summarizes the important trees species at the cluster level: (1) important tree species according to consumption; (2) timber species according to the income of each species of every village in one cluster.

**Table 20: Summary of data on timber harvesting in cluster village:**

No.	Name: Commonly used species	Name: High-income species	Value	Total Village
1				

❖ **Summary and analysis the extinction timber species, and proposal for regeneration and new plantation:**

The staff must carefully key-in the data into excel file, under the following headings:

- 1) timber trees that are close to extinction: Name/types, number of years extinct, reason;
- 2) timber trees proposed to enrichment planting and management in forest: Number of households, reason, methodology;
- 3) timber trees proposed to plant in gardens or plantations: Number of households, reason, methodology.

This data is used as reference or base for the PFALUPAM team in the implementation of mission 3: the development of forest and land use management (FLUMZ) in the future. Summarize and analyze the data of each village at the cluster level as shown in the table below can help in the process for rehabilitation planning and promotion effectively and efficiently because each village can be seen within each cluster.

**Table 21: Summary of each tree species rehabilitated/replanted in cluster village forest:**

	Name: Tree species that that village proposed to plant, rehabilitate in the forest										
Village name	Rosewood	teak	Mai dou	Mai tae	Mai yom	Rosewood	teak	Mai dou	Mai tae	Mai yom	

**Table 22: Summary of tree species rehabilitated/reforested in cluster village garden:**

	Name: A species of tree that village propose to plant in the garden				
Village name	Rosewood	teak	Mai dou	Mai tae	Mai yom

**10. Summary and analysis on wildlife information:**

The data gathered in each village on wildlife, via form 6, must firstly be keyed-in to the computer. Then the data is checked for completeness and a 'reality-check'. If the data seems unrealistic, then the data compiling staff must give it back to the data collection staff, to query them about the odd data. Apart from this, no further analysis of this data is undertaken. Rather, it is used as:

- 1) An adjunct to decisions on forest zoning for protection of wildlife species;
- 2) Used in the development of village regulations related on natural resource management;
- 3) used as a baseline, for future monitoring

**11. Summary and analysis on aquatic animal and product:**

Similarly, the data gathered in each village on aquatic life that is harvested, via form 7, must firstly be keyed-in to the computer. Then the data is checked for completeness and a 'reality-check'. If the data seems unrealistic, then the data compiling staff must get back to the data collection staff, to query them on the odd data. Apart from this, no further analysis of this data is undertaken. Rather, it is used as:

- 1) An adjunct to decisions on zoning riparian forest;
- 2) Use in decisions re, FCZs (fish conservation zones);

- 3) Used in the development of village regulations regarding the natural resource management; and
- 4) Used as a baseline for future monitoring.

Then, for summarization of key data of both aquatic and wildlife can be summarized into one table for the whole village cluster as below:

**Table 23: Summary of wildlife and aquatic species, of all villages in the cluster village:**

Aquatic animals				Wildlife			
	Used a lot		Used a lot		Used a lot		Used a lot

## 12. Summary and analysis of problem census and possible resolution:

Use form 8 to interview inquiries to PRA group:

1. Compile a succinct list of the main problems faced in key sub-sectors, mainly related to agriculture and forestry, but also some other sub-sectors;
2. Brief explanation (as far as villager know) of the causes of each problem;
3. The effects or impact of the problem; and
4. Ideas or proposals that the villagers may have to resolve or overcome the problem.

To query the data and opinions on the census issue, form 8 includes questions below to inquire about problems that villager faced in various sectors on : (1) management of agricultural land and the forest, (2) management and use of wood, (3) management and use of aquatic animal, (4) management and use of wildlife, (5) paddy fields (6) upland rice cultivation, (7) vegetable crops, (8) planting of trees and industrial crops, (9) animal husbandry, (10 ) marketing/distribution of crops, (11) drinking water and water supply, (12) health and other issues.

The land use planning officer must enter the information (into computer) from the interview form obtained from the field. Then check if the information is complete and accurate. If the information is found to be inaccurate, it must be checked with the data collection staff to find out the cause and the incorrect information.

Then print out the census information and distribute it to each village. This type of information is also used to: 1) participate in the process for developing the of participatory planning, allocation and management of agricultural and forestry land in the third round, and 2) use it to create village management rules and plans to find solutions in the next step.

This type of data can be analyzed at the cluster level rather than a single village, which is a more efficient method. Some examples of data analysis on problems census of villages are in the following table:

**Table 24: Table summarizing census issue in the village of village xxxx, province yyy:**

Problems	The cause	Impact	How to solve
<b>Forests and non-timber forest products decline</b>	Population growth, timber prices, poor management, exploitation and land concessions.	Decreased number of NTFPs and timber and extinction, climate change	Allocate management areas and zoning of use, replant existing forests and rehabilitate, prosecute offenders, establish management rules.



Problems	The cause	Impact	How to solve
<b>Aquatic, wildlife drop</b>	Villager increasing, to the fish more, search Center, aquaculture / Wildlife prices as the market, no wildlife management.	Wildlife / drop and aquatic species became extinct, find taking a difficult and tricky to find in other areas.	Increase measures to manage the implementation of weir regulations against hunters and collectors, establish protected areas.
<b>Yields fall</b>	No irrigation, pour soil, rainfall season, lack of technical knowledge, pest destruction.	Lack of rice, lack of production costs and income.	Improve the soil, use rice seeds to grow many kinds of crops in rotation, there are conditions for irrigation or groundwater drilling.
<b>Raising large animals causes epidemics</b>	Lack of technical skills, natural grazing, no grazing.	Decreased animal numbers, lack of animal income.	Allocate livestock areas, create pastures, promote technical knowledge, vaccination.

### 13. Summary and analysis of requirement and potentials for development:

Form 9 aims to compile, via a facilitated PRA session, a succinct list of the main proposals for development of key sectors in the villages, and a brief explanation of the key pre-conditions and potentials that the villagers see as the reason to make such proposals, based on the following table form 9 aims to compile, via a facilitated PRA session:

	Sector/ development activity	location	Any special pre-conditions or potential
1	Forestry		
2	Agriculture		
3	health and sanitation		
4	infrastructure)		
5	Other		

Firstly, the PFALUPAM staff must key in to the computer (Word file) all this information as recorded on the paper format. If there is any unrealistic or unclear information, then they must go back to ask the original staff who collected the information.

This “proposals and potential for development’ table is then printed out for each village, and as is used as a key input into the forest and land use zoning, during step 3.

This information can also be summarized at the village cluster level – development activities can sometimes be more effectively planned and implemented over a range of villages, rather than in individual villages (for example, the TABI SPA approach). Some examples of such cluster village level summaries are provided in table 26 below.

**Table 26: Summary of proposals and development conditions at cluster village level:**

No	Village AAA	Village BBB	Village CCC	Village DDD

### 14. Summary and analysis of household level: population, status and livestock:

#### ❖ Population and ethnicity and occupation:

The names of husband and wife must be correctly keyed-in to the Excel file, and ideally the same as their names in the ‘family book’ or any other official list of village families in the village administration. The number of males and females should equal the total family

members, in each family, and then the total number of persons is simply summated at the bottom of the table, using the coming function of @sum (O10:O29). The ethnic groups of both husband and wife must be clearly keyed-in to the excel files, and in standardized spelling, so that the number of families or persons in each ethnic group – in the whole village - can be easily summated by using the function =COUNTIFS(MXX:MY, "EthGrp")

**Example:**

Number of Hmong EG households	=COUNTIFS (M10:M29,"hmong")
Number of Khemu EG households	=COUNTIFS (M10:M29,"khamu")
Number of Phouan EG households	=COUNTIFS (M10:M29,"phousn")

The main occupation of both husband and wife must be clearly keyed-in to the excel files, and in standardized spelling, and the number of person - in the whole village - with each different main occupation can be easily calculated by using the function =COUNTIFS (MXX:MY, "occup")

**Example:**

Number of (mainly) wet rice HHs	=COUNTIFS (M10:M29,"wet rice")
Number of (mainly) upland crop Ks	=COUNTIFS (M10:M29,"upland crop")
Number of (mainly) trader HH	=COUNTIFS (M10:M29,"trader")
Number of (mainly) livestock raiser	=COUNTIFS (M10:M29,"livestock")

❖ **Rice sufficiency of each household:**

Rice self-sufficiency for each family is calculated based on a standard requirement of 350kg of un-milled rice per year, and as follows:

- 1) rice requirement per family = Nr. family members X 350 kg,
- 2) insert families own 'estimate' of their annual upland rice production - in kgs/year,
- 3) insert families own 'estimate' of their annual wet rice production - in kgs/year,
- 4) then: estimate of total annual rice production = B + C,
- 5) Then Rice Sufficiency = A – D.

**Table 27: Concerning the volume of rice demand**

rice requirement	Upland rice prod	Wet rice production	rice deficiency
Kg/year	Kg/year	Kg/year	Kg/year
13	14	15	16
(8x350kg)			(13-14+15)

Then, the total surplus or deficiency for the whole village can be calculated by adding up each household value, in column 16, at the bottom of the table, column 16.

*Note on household rice production:* The first household interview (Form 10) asks them to estimate rice production. Later, in form 12, they are asked about each plot of land they use and production from each plot - which should be more accurate. So, this more accurate rice production value can be re-entered into table 10, during data analysis step.

❖ **Number of livestock of each household:**

The number of each livestock species held of each family must be keyed in correctly. Then two summations and two calculations are made for the whole village, for each livestock species:

**A:** sum the total all each livestock species of the whole village by using the function @sum (O10:O29) at the bottom of the table.

**B:** then, sum the number of household in the village that actually have/raise each livestock species, by using the function =CONTA (X?: Y?)

Then calculate: 1): the average number of livestock per household who actually raise that species = A/B, and 2): the average number of livestock per total nr. of household in village = A/Nr. HH in village

#### **15. Summary and analysis of income source and indicative income level:**

Form 11 ask's each household to report on their indicative annual income earned from various sources, and the form has a pre-determined set of categories of income. For some categories, only the total annual income is asked, while others, which may have multiple types of income, villager is asked about the income from different types in that category as:

- 1) Revenue from rice sales: Revenue from sales of paddy and upland rice;
- 2) Revenue from sale of other crops: Revenue from sale of each crop;
- 3) Revenue from the sale of livestock: From the sale of livestock as a whole or may be divided into categories;
- 4) Revenue from fish sales: Revenue from fish sales only;
- 5) Revenue from sale of NTFPs: Names and income from each species;
- 6) Revenue from sale of charcoal: Revenue from sale of all charcoal only (charcoal);
- 7) Revenue from sale of timber: Revenue from sale of timber only;
- 8) Revenue from sale of handicrafts: Revenue from the sale of all handicraft products;
- 9) Revenue from doing business: Each type of business and income from such sectors;
- 10) Revenue from employment: Revenue from employment and total income.

Then two summations and two calculations are made for the whole village, for each category of income:

- 1) **A:** Sum the total of all income for each income type/source, by using @sum (K8:K84) (for example) at the bottom of the table.
- 2) **B:** Then, sum the number of household in the village that actually report to get income from that/each sources, by using the function =CONTA (K8:K84)

Then calculate:

- 1) The average income from each source, of those households who actually get income from that sources = A/B
- 2) The average income from each source for the whole village = A/Nr. HH in village

This can then be summarized and reported for each village, or can be summarized and reported for the whole village cluster, which will enable comparisons between villages, and a good overview of income sources in the whole cluster village.

#### **16. Summary and analysis of land data interviewed from family level - Comparison with current land use data obtained from maps:**

##### **❖ Compile and analyze the data from household interviews:**

All information obtained from the family interview and recorded on form 14 must be carefully entered into the computer excel database, and include the following column headings:

- 1) Plot: Most families use many of land, thus must do ranking 1, 2, 3, 4 respectively;
- 2) Location: The location of each plot;

- 3) Area: The area of the plot as hectare unit;
- 4) Use (plants grown): Plants grown or the use of each plot, should carefully use the same standard wording to be able to analyze later;
- 5) Yield: This is the estimated yield of each household of the plot obtained from the previous production season;
- 6) Targets: Targets for future use are important information in planning, zoning;
- 7) Fixed or rotating soil: The nature of constant or rotational use is important in planning and allocating:
  - Origin of land: Also use standard terms, for example, land clearing and development, land acquisition and non-use, acquisition, inheritance or lease, government grant, common land, annual lease, or lease of land, etc.?
  - Documents: If possible, fill in the list of standards below, for example: No land documents, tax returns, land registers, land titles, etc.?

A summary of each village following: 1) lists the species or types of land forms 14) counts plot type or species, 2) the number of families who grow the crops or possessions each land, and calculate the total area planted for each species or types of land.

❖ **Compilation and analysis of land data from current land use from maps:**

GIS Team to compile statistics using land includes the area of each type of land use current team information as the specifications and drawings in "plans to use current land and forest cover" (mapping CLUFC).

Current land use data obtained from GIS mapping will be highly detailed but depends on the type of agricultural, forestry and other land use in each village. To collect each sub-land use type, especially non-agricultural or forest land type, be able to compare with the land use data obtained from the family level interviews.

This task is the responsible of the data team, examples of compiling current land use statistics and forest cover are shown in table 21.

❖ **Comparison of current land use data obtained from mapping and family level interviews:**

The data team will need to create a table to compare each of the main types of agricultural land use obtained from GIS mapping and family level interviews (form 14) for comparison, an example of a comparison table is shown in the table below.

The purpose of the comparison between the two sources is to check the accuracy between the two sources, if there is a discrepancy, must decide which source is closest to the truth, taking into account the steps in the comparison, including: (1) observing the differences between the two sources, (2) explain why there are differences ; (3) try to decide which source information is closest to the truth and if it is not in the above three cases, record the type of land use that cannot be compared, then review and check more when the third round of the target village.

**Table 28: Land equivalents between data from CLUFC maps and family level interviews:**

Land use information obtained from the current land use map		Information from family interviews		
Land type	Area / ha	Land type	Area / ha	Land type

**Results from analysis on rice:**

- 1) Most of the rice fields obtained from family interviews are smaller than the actual area to avoid paying full land tax;
- 2) The drawing of paddy fields by GIS method will increase the area by about 10-20% because the drawing will include paddy fields, side walks and paddy fields.

**Results from analysis on upland cultivated area (upland rice in 2016):**

- 1) Upland or shifting cultivation area, obtained from family interviews, is usually smaller than the actual area;
- 2) Some species that villager refer to as "permanent cultivated areas" may be identified on the map as "upland crops";
- 3) However, areas with significant differences need to be re-examined, possibly due to errors in the mapping process. In some cases, the area under cultivation may cover two production seasons, a common mistake.

**Results from analysis on Teak garden:** It is possible that the information obtained from the interviews is accurate. GIS technicians need to find the teak garden area that has not yet been mapped.

**Results from analysis on rubber plantation:** Most of the rubber plantation areas identified on the map are concession rubber plantations, but the data also show that there are some rubber plantations that belong to the villager and the technical team will have to try to review with the villager and set up a three-time plan.

**Step 5: Soil analysis and soil fertility assessment:**

(Details of the contents of this step are in a separate file)

## **Stage 4: Develop the forest and land use management zone (FLUMZ) (field mission 3):**

### **Step 1: Direction to develop the forest and land use management zone (FLUMZ) of the village:**

In order to develop the forest and land use management zone (FLUMZ) plan of village accuracy, ensure the quality and quantity and consistent with the strategy on socio-economic development of the central and local government sector and suitable to local conditions and potential that targeted the aims on sustainable using of agricultural land and forests as well as to sustaining and preserve agro-biodiversity for forever utilization.

So, before the development of forest and land use management zone (FLUMZ) in each village or cluster village, it must be aggregated to compile and analyze the data in various ways from the implementation of round 1 and round 2 to study the potential and possibility to create FLUMZ with consistent and appropriate to local conditions and potential for developing of socio-economic in target area. The meeting to report on the implementation of round 1, round 2, and present the vision to develop FLUMZ is necessary and important to review and report on the process for implementation PFALUPAM, plans for the assigning the village PFALUPAM committee, map areas covered villages, land use, current agriculture and forestry, the socio-economy information (as a group and family model), agricultural biodiversity information and other types of information. The presentation on vision of FLUMZ is important reference for villagers and local authorities to take discuss and comment and have common direction for developing FLUMZ in all the target villages of cluster village.

#### **1) Preparation for village meeting:**

Compile and analyze the data received from the work practiced in round 1 – 2, and basic information for creating the FLUMZ in targeted areas such as:

- 1) Basic geographical map of the village;
- 2) Map of village management boundaries;
- 3) Current agricultural and forestry land use;
- 4) Socio-economic information and conditions (group and family);
- 5) Information on agricultural biodiversity and other types of information;
- 6) Summary of (i) census, and (ii) proposals of the villages to be developed.

After the compilation and analysis of all data gained from the work practiced in round 1 and round 2, then the team must be consulted in order to determine how to create FLUMZ before going to the target villages.

The preparation of the dissertation is very important, the responsible team must pay attention and be very responsible because it is the submission that the leadership of the district, province and the villagers will be involved. Therefore, the information presented should be 1) accurate, 2) easy to read, 3) easy to understand and 4) easy to analyze as detailed below:

#### **Presentation 1. PFALUPAM process:**

Present an overview of the vision, principles terms, process, steps and tasks of the PFALUPAM, this will make participants understand clearly before working.

#### **Presentation 2. Process for developing village basic map and village boundaries map:**

Explain the process for developing the village basic geographic mapping and participatory village demarcation, which will cover three main topics: Reasons, objectives, and Implementation methods. Also presentation on some example pictures



of works implemented during the past, village's PFALUPAM committee appointed, and the village-to-village memorandum of understanding.

**Presentation 3: Socio-economic status and agro-biodiversity:**

The data will be presented on this topic include: general information of village, population and ethnicity and status, main occupation, crop species and livestock, calendar for cropping each species, agro-biodiversity farm in the village - the diversity of species, rice, upland cultivation and main crop, forestry and using of wood and NTFP, aquatic animal, wildlife and family income and source of income.

**Presentation 4. Current agricultural and forestry land use situation and compare the info from land use mapping and from household level interviewed:**

Describe the process of planning, land use, current agriculture and forestry situation and compare the area of land use from the map and from interviews with family, which includes 3 tasks as: 1) the process of mapping on CLUFC, 2) statistics area of land use from mapping and 3) compare the area of land use from the map and from interviews.

Describe the CLUFC process, mainly based on the following functions:

- 1) How to study satellite imagery and topography;
- 2) Assessing and identifying forest areas that have not been cleared or have been cleared in the past but are now managed as forests;
- 3) Assessing and determining the area of permanent agricultural land for many crops;
- 4) Assessment and determination of upland agricultural land;
- 5) Assessing and determining other types of land use areas;
- 6) Inspection of accuracy in the actual field;
- 7) Reviewing and revising the CLUFC maps based on the results of survey.

Then present the CLUFC map (draft version) to the meeting, leading a comparison between the statistics obtained from the map and the household level interviews, which the facilitator must pay attention to and clarify some of the following issues:

- 1) Highlight the differences between of land use statistics obtained from two sources;
- 2) Explain the reasons for the discrepancy in land use statistics from two sources;
- 3) Ask the village representatives or stakeholders on why there are differences in current land use statistics between the two sources.

**Table 29: Comparison of land use data between map and household level interviews:**

Data from participatory mapping		Land use data obtained from family level interviews		
Land type	Area	Land type	Area	Land type
Paddy land	35.97	Paddy land	35.97	Paddy land
Land (Year 2016)	251.06	Land (Year 2016)	251.06	Land (Year 2016)
Stable agricultural land	5.48	Stable agricultural land	5.48	Stable agricultural land
Teak	2.85	Teak	2.85	Teak
Rubber	82.06	Rubber	82.06	Rubber

### Presentation 5. Village census and propose for agriculture and forestry development:

Explain the concept and potential conditions for the development of the target village as a basis for the participants to make in discussion to find common solution and determine the appropriate development plan of the target village.

**Table 30: Compilation of multi-village census (by cluster village: XXX)**

The cause	Impact	Solutions	Village A	Village B	Village c			
<b>I. Regarding the management and use of timber</b>								
<b>Issue: Timber use (declining forests)</b>								
Upland landscaping, logging for sale, no forest area designated for conservation and forest for consumption	Drought, unseasonal rains, insufficient timber	To determine the use of clear, practical rules strict	1	1	1	1	1	1
<b>II: Regarding the management and use of non-timber forest products</b>								
<b>Issue: Use of non-timber forest products (decrease)</b>								
Collection is of zero nature (including roots, stems or cuttings) does not cover conservation areas.	Insufficient consumption Revenues from non-timber forest products sales decreased	Clear demarcation of use areas, establishment of regulations for the management and rehabilitation of replacement plantations	1	1	1	1	1	1

**Table 31: For development based on the potential of the cluster village XXXXX**

No.	Village A	Village B	Village C	Village D
Trees	Saphai Wood is popular in stone Aromatic wood	Alkaline wood Ten sticks Red deer wood	Sand sticks Basketball bat Alkaline wood	Alkaline wood Red acacia wood Basketball bat
Plants	Growing rice Deposit spur	Planting rice Deposit	Planting rice Sesame deposit	Planting rice Deposit spur
Forest products	Deposit Deposit fee Broom Pong Peng	Broom Deposit Red vines Pong Peng	Broom Bark Deposit Mulberry	Broom Rattan deposit Deposit Bark
Animals	Cows, goats, rats, birds	Cows, goats, rats	Poultry, cattle, buffalo, mouse	Cows, cattle, mice, goats, animals Wings

### Presentation 6. suggestions or ideas on how to develop the forest and land use management zone (FLUMZ):

Offer ideas and guidance for developing the forest and land use management zone (FLUMZ) in the target village. However, it depends on the potential conditions of village land use. If there is a lot of upland plantations, alternatives such as group and as scatter plots may be offered, or if the village has a lot of upland maize plantation, which causes

deforestation, alternative methods must be provided to promote stable maize cultivation. The team must explain the form for collecting data on agricultural land and forest land owning as well.

## 2. Compile and print out the information and documents:

Print out the summary forms and documents from the practiced round 1 and round 2 and distribute such documents to participants in the meeting to review and provide comments and used it into the development of forest and land use management zone (FLUMZ) in round 3, which are detailed below:

**Table 32: Forms and documents:**

Form	Name of the form and draft of the document	Cause
	<b>Information collection form</b>	
<b>I</b>	<b>Round 1 data collection form</b>	
1	General information of the village (initial)	Village level
2	Village biodiversity data	Village level
3	The production and the calendar to grow crops agriculture on the principle of village	Village level
4	Information on harvest, condition and priority of non-timber forest products	Village level
5	Information on logging, use and priority timber	Village level
6	Information on wildlife	Village level
7	Information about aquatic animals	Village level
8	Inventory of problems and solutions	Village level
9	Information on the conditions and potential for village development	Village level
10	Results of the survey of important geographical locations	Village level
11	Record of village boundary reference points	Village to village
<b>II</b>	<b>Round 2 data collection form</b>	
12	Family needs for food and livestock	Family level
13	Family income information	Family level
14	Family-level land use information	Family level
15	Soil samples	Village level
16	Record on CLUFC survey	Village level
	<b>Draft document</b>	
	<b>Draft document Round 1</b>	
1	Village application letter for appoint the village PFALUPAM committee	Village level
2	Application letter from DAFO for appoint the Village PFALUPAM committee	Office of Agriculture
3	Memorandum of the village boundary	Interior office
4	Agreement of district mayor on appointment of the village PFALUPAM committee	Mr. Mayor

## 3. Map publishing:

Published the map to show in the meeting and for the team to use in work on FLUMZ development (round 3) in the target village which are detailed below:

**Table 33: Map Name and items for meetings and Implementations in target village:**

No	Map name	For the meeting	For the implementation of the field
1	Topo Map	A3	A3 or (A2, A1, A0)
2	Satellite imagery maps	A3	
3	CLUFC map	A3 or (A2, A1, A0)	A2 or (A1, A0)
4	SIMCLU map has no symbols	A3	
5	SIMCLU maps are iconic	A3	A2 or (A1, A0)

#### 4. Participants of the meeting:

In order to make the meeting meaningful and consistent with the process of PFALUPAM, the person who will be invited to attend the meeting are as follows:

- 1) District leadership (district chief or deputy district chief);
- 2) Head/Deputy Head of the Provincial Department of Agriculture and Forestry;
- 3) Provincial Agricultural Land Management and Development Section;
- 4) Provincial Land Development;
- 5) Head of the District Agriculture and Forestry Office;
- 6) Head of the District Office of Natural Resources and Environment;
- 7) PFALUPAM Technical Team and village team;
- 8) 3 village representatives from each target village of ccluster village;
- 9) Representatives of project staff, companies or other parties as appropriate.

#### 5. Agenda:

The meeting agenda for reporting the implemented works in Round 1 - 2, and proposed to develop the forest and land use management zone (FLUMZ) as follows:

**Table 3: Meeting Agenda:**

Time	Items	Responsible duty
8: 30-9:00	Register	PFALUPAM TEAM
9: 00-9:10	Welcoming and announcing the purpose of the meeting	FALUPAM leader organizing committee
9: 10-9: 30	Opened the meeting	Chair
9: 30-9: 45	<b>Session 1:</b> Introduce the PFALUPAM process	PFALUPAM TEAM
9: 45-10:15	<b>Session 2:</b> Basic map and village management boundaries maps	PFALUPAM TEAM
10:15-10:30	Take a break to drink coffee	
10:30-11:15	<b>Session 3:</b> Socio-Economic Information and Agro-Biodiversity	PFALUPAM TEAM
11:15-12:00	<b>Session 4:</b> Current agricultural and forestry land use and compare the land use areas data obtained from mapping and from family interviews.	PFALUPAM TEAM
12:00-13:15	<b>Break lunch</b>	
13: 15-13:40	<b>Session 5:</b> Session: (i) a census, and (ii) a summary of village proposals for agricultural and forestry development and other activities.	PFALUPAM TEAM
13:45-14:00	<b>Proposal 6:</b> presenting ideas for developing the FLUMZ	PFALUPAM TEAM
14:00-15:00	Provide feedback to improve edits and suggestions from village participants	
	Village 1	Village representatives
	Village 2	Village representatives
	Village 7	Village representatives
15:00-15:10	Take a break to drink coffee	
15:10-16:00	Continue to provide feedback to edits as suggestions from other participants	Meeting Delegates
16:00-16:30	Summarize from discussions, comments and agreements	PFALUPAM TEAM
16:30-16:45	Informed the target villages to implement the third round	PFALUPAM team leader
16:00-16:45	Closing the meeting	Mr. President

#### 6. Conduct the meetings:

The organizer welcome to all participants and present the objectives of the meeting. After the chair declared to open the meeting. Then the team presents the report on the implementation of works accomplished in Round 1 and 2, and the development of FLUMZ vision, by following the description of agenda.

After presenting each chapter is finished, the chairperson opens plenary and ask the participants to have comments, questions and discussion on issues that are not clear or recommending particularly on the results of the works done in Round 1 and 2, and the draft

of FLUMZ for verify the accuracy of information in various fields for further have common understanding agree upon. After that, the team presents the plan for developing the village forest and land use management zone (FLUMZ) with each target village.

## **Step 2: Development of the forest and land use management zone (FLUMZ):**

The forest and land use management zone (FLUMZ) is a vital step of PFALUPAM process. The objectives and targets of the field mission 3 is to present and explain the possible options and usefulness of the FLUMZ map that must take into account on reviewing of data: socio-economic, agro-biodiversity, current agriculture and forestry land and local SEDP.

Some important factors must be considered as:

- Possibility for setting the scattered upland agricultural land into a large area with a clear scope of use, ability to make annual cycle use each year and can be monitored;
- Identify the agricultural land like paddy and vegetable garden that are not possible to transform as one large parcel together (depend on resolution of satellite image)
- To keep the small and scattered parcels of forest area closed to the agricultural land without destroy is still in challenging and difficult to monitor, but if possible, just keep it stay in the forest and land use management zone (FLUMZ).

### **1 Participants for developing FLUMZ:**

Participants in the development of the forest and land use management zone (FLUMZ) is based on the team and the group work. There may be have some families who did not participated in the activities in this third round, due to being affected or in conflict with the village guidelines/strategies. For example: 1) Families engaged in upland agriculture, which are set to be converted into forest land and designate new production areas for them, and 2) Families who have many plots of upland farming areas that to be kept return some to community. Then later on, invite these affected family to join the meeting to listen on clarification of forest and land use management zone (FLUMZ) and make discussion to seek common resolutions together.

### **2. Main activities**

Procedures for developing the “forest and land use management zonation” (FLUMZ) can be organized around 11 main activities, as listed in the table 1 below. In general, the process will take 3 to 4 days, depending on the complexity of land use in the village.

#### **Activity 1: Present the results of the implementation of Round 1 and Round 2:**

After the introduction of the program and the team work already to village, then representative of the team must inform the village authorities and villager to know and understand back on the works and results from the implementation in round 1 and 2 through the presentation of data analysis as:

##### **❖ Overall village data:**

Village data consisting of village problem, village forest, utilization of wood, aquatic animals, wildlife and potential for village and household development, including the status of rice production, demand of rice, livestock management, source of income, possession and use of land of each family. Open opportunities for villagers to discuss and exchange views on such information. If there is any information that is not correct or not appropriate, thus the team has to edit it as villagers commented.

❖ **Discuss on current agricultural land use and forest cover (CLUFC):**

Explain the basic geographical map of the village and the current agricultural land use and forest cover (CLUFC) map together with data of each type of the land use in the village as follows:

- 1) Roads and rivers within the village (with the names);
- 2) Location of neighborhood or village;
- 3) Location of important permanent farmland within the village;
- 4) Upland cultivation sown in satellite imagery-date of photography, previous and present upland cultivation areas of families based on satellite imagery and status of upland cultivation practiced as scattered without control or has some level of management;
- 5) Forest areas that have never been cleared or previously cleared but already restored as forests;
- 6) Other land use for other purpose existed in the village, such as concession land, pasture land, degraded land etc.

**Activity 2 Optimum for developing the village forest and land use management zone (FLUMZ) plan:**

In order to make villagers a better understanding of this optional, a sample map of the agricultural and forestry land use areas of each village is to be served as a basis for examination and decision-making for determining the agricultural and forestry land use areas of the village, which are based on the principles of:

- 1) Map of the current land use that used to be scattered upland plots, but at present time has been already compiled as the zones for annually rotation cropping;
- 2) Map of the forest and land use management zone (FLUMZ).

After completion of the offering and the choice for developing the village plan on forest and land use management zone (FLUMZ) mentioned above, thus the team has to open opportunity to villagers take discuss together (a team lead consultation) by starting from: verification and certification on the reality of information that the team presented and to villager with accurate, clear information on the team presentation , explaining how / vision of the development of the village , and express common agree or accept the choice for developing the village forest and land use management zone (FLUMZ) plan.

To ensure the allocation of agricultural land for production to meet the needs and growth of the village. Therefore, the team must consider other internal-external factors, which should include:

- Static of paddy land development;
- Development of permanent cultivation or gardens;
- Integrated industrial trees plantation area;
- Development of large livestock areas (cows, buffaloes, goats);
- Demand for upland land or other upland crops;
- Demand NTFP and timber harvesting (for food, crafts, income and medicine);
- Population growth;
- Estimate on the changes in the agricultural system;
- District and provincial socio-economic development plans.

If village has too many areas for upland cultivation, thus the number of upland cycles or rice and other crops cultivation must be discussed for determining the appropriate



upland cycles in the village, taking into account factors such as soil quality, slope etc. it may change according to the need of villagers to use the land for other purposes.

The zoning should start with the type of land that is easier to classify first, such as fixed agricultural land, because this type of land is already defined in the current land use map, which must be included also in the FLUMZ map. But sometimes villagers may propose to expand the production land area, so it is needed to be discussed and inspected on possibility and suitability. If feasible, the extension must include it in the FLUMZ map as well.

### **Activity 3: Agriculture land use zoning identification:**

The two maps that are usually used, together, during the zonation process, are:

- 1) **GeoSIMVB-CLU/OP:** is the satellite image overlaid by the CLUFC polygon boundaries only;
- 2) **GeoCLUFCVB:** is the CLUFC **maps**, with land use as coloured-coded polygons.

#### **❖ Allocation of agricultural land use zones.**

Should be classified in each sub-land use type according to the color code classified for each type of land use as:

- 1) **Demarcation of paddy fields:** Study on feasibility for expanding the paddy fields and map them to FLUMZ. However, the potential for paddy development must be studied. If it is possible, designate as reserve area to be expanded into paddy fields in future and simultaneously designate on land allocation map;
- 2) **Identify permanent agricultural land,** is to classify the short and long period of rice and crop plantation, agro-forestry practices and tree plantation (for commodity), then review the possibility of land that will prepare to transfer into permanent agricultural land, and finally insert it in FLUMZ map after field inspection survey for certification accomplished
- 3) **The construction of irrigation :** If it is not seen in CLUFC map (or if the irrigation scheme appeared after mapping CLUFC), so it has to be filled in the FLUMZ map, and if the village had planned to construct new irrigation, so classified it in the category for 'land expansion for irrigation project';
- 4) **Determining the pasture and fodder,** identify and draw boundaries of pasture land based on each different type of such areas e.g. small size for household, big size for common village, natural grasslands, raising animals in forest and release animal into cultivation land after production;
- 5) **Determining the concession land:** It is necessary to specify the concession area before making the FLUMZ map and the team should take the time to update the information more accurately and clearly;
- 6) **Demarcation of industrial plantations:** The demarcation of industrial plantation is largely based on the existing of forest and land use management zone (FLUMZ). Then jointly evaluate and study the feasibility of the plan to establish a new industrial plantation area or increase the plantation area. If such an area existed, it will be necessary to conduct a field survey as well as interview families who want to plant these industrial trees (see Table 3).

**Cause:** Industrial timber plantations generally have three purposes: planting for timber, for selling timber, and for making charcoal or fuel. Implementation process should:

- Review the area of industrial plantations in the village, how many families are planted and how much area, and what kind of varieties are used by looking information from Form 12;
- Ask villager if they plan to start planting or expanding industrial plantations in the village and whether they already have land to grow;
- The PFALUPAM team demarcated the area and determined the area planned for industrial plantations, to understand the current land use on the CLUFC map;
- The team ask some more questions: why villager chose the area to plant industry tree, reasonable of financial and labor that villager use in tree plantation, and they are looking for companies to invest venture plant industry or not?
- Team must interview each household and record land use information on Form 12 (revised version) to record industrial plantations (see Table 4);
  - Then land planted industry tree is to be draw on the map;
  - Then make a plan to inspect of these industrial plantations.

#### ❖ Delineation of upland cultivation zones:

Review the rotation production system during the past and present times to understand the content and number of family practices upland cultivation - cycle of the crop rotated, the proportion of upland crop by using CLUFC map, management system, preparation and use of agriculture land, and the payment of land taxes.

Undertake consultation with village PFALUPAM committee, district, cluster and the villager for having common uniform on management and use of upland agricultural production (system), the production organization (as a group) as well as advantages and disadvantages in decision making to select land use cycles and the crops species to be produced and must take into account on number of factors, including soil quality, slope and weed grass.

The calculation (estimate) of the upland agricultural production area to guarantee secure of rice paddies based on the environmental characteristics of the village is given according to the following formula:

- 1) Calculate the amount of food demand of the village:  

$$\frac{\text{Rice consumption rate / person / year} \times \text{Number of populations in the village}}{1000 \text{ kg}}$$
- 2) Calculate the demand for the production area of the village for 1 year  

$$\frac{\text{The amount of rice needed by the village}}{\text{Yield / ha}}$$
- 3) Calculate the production area needs of the family/year:  

$$\frac{\text{Village production area requirements}}{\text{Number of families in the village}}$$

Delineation of upland crops practices every year must be described the first year before all - it must be the oldest plot. Then allocate the year 2 which younger than the first and continue by the younger.....youngest respectively. Other factors that should be considered in the process are: 1) forests land remaining but surrounding upland cropping, if possible, keep it as forest land as it is like in the forest and land use management zone (FLUMZ), especially the riparian forest areas along the riverside, and 2) the land that is not belonging to any communities or production groups, e.g. grass farming land that might be inside the upland cropping area.

❖ **Recording the data on agriculture land zoning:**

After all areas were already agreed with clear insight, the team must record all every details in the "form 17: recording the agriculture land zoning" in one village may has many zones allocated, but the GIS team has to summarized in Table 'summarizes each zone of the forest and land use management zone (FLUMZ). The area of each of these areas is derived from the calculations on the GIS system.

**Activity 4: Delineation of forest land zones:**

The first step is to review the data from the practice rounds 1 and 2 and information from CLUFC map and to review the status of using of natural resources and village forestry situation for developing the plan on the need of forest land and the future ecosystem e.g. NTFP, wood and current forest cover.

❖ **Forest land zoning:**

All information is provided as answers and ideas of the villagers. If necessary, the staff should make an option for the villagers to choose and decide. To avoid making confusion to villagers when determine the forestry land use, it must leave villagers to decide by themselves that is what type of forest (3 state forest categories and local type of forest classified).

❖ **Colour code classified for the forest and land use management zones:**

The color code of this task is detailed in the table (attached).

❖ **Maintaining current forest and enlarging new forest land in PFALUPAM approach:**

In many cases, the riparian forest in the village area were maintained with many very good reasons, thus it should be kept as it is and classify it as forest management area in the forest and land use management zone (FLUMZ) as well. If in the village has an irrigation system, thus it is needed to classify the water source protection forest as forest area in the forest and land use management zone (FLUMZ).

In some cases, to maintain the 'forest that had been cleared since before in village' to be as regeneration forest in the land use management zone (FLUMZ), according to villagers needs and agreed to keep it as forest and villagers might propose to enlarge more forest land, or restore the empty land now into forest land for making village has more area covered by forests and has more forest products, that is good, but the villagers must consider some of the following:

- 1) Review whether the expansion of the forest land of this village is really possible? Are there no real land use activities in the area?
- 2) Compile a list of families currently use of such land (see Form 18: forest land zonation) and then discuss with these families and must have a plan for compensation to the affected families, because their land will be transferred into village forest land. After discussion and have common decision to defining as forest land area already, but if there is any site not yet clear, it is necessary to conduct field survey and inspection again.

❖ **Recording the data on forest zones:**

After each forest land allocation area can be unanimously agreed upon and cleared, the team must record all details in "form 18: forest land allocation record" (see Table

12). These forms will contain important information and tools for managing the forest land area.

**Activity 5: Classification of other land zones:**

After completing the demarcation of agricultural and forestry land, the team and the villager should continue to demarcate other types of land according to the 'management zones or sub-land types' of the 'land management and forest zoning classification' table. All 'management zones or sub-land types' sections do not need to be recorded on the land use form, as all plots are drawn/digitized/color coded into the GeoSIM or Geo 2.5 D Topo maps on a computer.

**Activity 6: Discussion with effected households (if any):**

After finishing the zonation of forest and agriculture and other land zones, the PFALUPAM technical team and Village PFALUPAM committee have to review and somehow resolve the problems of those families whose land use is affected by (taken over by) the allocation to the community of a forest and/or upland agriculture land use zone. Examples of such situations are: **Example A:** Those households who has right and/or use upland areas, fields or fallows as their own due to either (i) inheritance, (ii) purchase or (iii) opening of the agricultural land, and thus do not want re-zoned a 'communal land'. If the village decides to adopt the "large group/whole village upland crop rotation zone" then these types of households would be affected, because they would have to forego their land claims, join the communal rotations, and their lands would also become part of the communal rotation. **Example B:** Those household whose has land use right (may be upland or lowland) is an area that has been decided to be zoned as community forest land of the village, in which no cultivation is allowed.

**Activity 7: Survey of land area allocated:**

During the team conduct consultation for mapping and demarcation of the area in the office, if found any problems, some unclear points in the forest/land area, sites that has problem on boundaries and allocated land areas that shown on the satellite imagery map. Then the staff must record all unclear points and then undertake field survey at where occurred the problems with villagers.

Generally, the field survey will be conducted on the 2nd, 3rd or 4th day of the third round of implementation in target village. In order to ensure that the survey is successful and can help to understand the area and assist in the process of mapping on agricultural and forestry land, as well as address specific issues, it is necessary to conduct a detailed survey in the following steps:

- 1) Before developing the village forest and land use management zone (FLUMZ) plan, the team should make a summary and report on the scope of unclear sites, then conduct field survey for making additional examination and final certification;
- 2) Staff diverts these points onto a current land use map with satellite imagery (SIM-CLUFC) and then divert it to a survey map.

**Activity 8: Integrate information from survey into improved FLUMZ map and plan:**

After the field survey and the teams arrived back from the field, they meet with other staff and village PFALUPAM committee in the village office and with reference of paper maps, they: 1) Explain what they saw, and show this on the GeoSIMVB or SIMCLUFC

paper maps. 2) Provide GPS points, and locate these on the paper maps - as much as possible.

**Activity 9: Presentation of the draft of FLUMZ plan to the village community:**

After the draft FLUMZ maps has been created, and the zone profiles drafted, a meeting should be held in the final day of the village mission to present the “draft FLUMZ plan”, to the village community for making them aware and discuss and, if OK, then give their indicative or tentative approval to the FLUMZ plan. A representative from each family in village should attend this meeting.

In general, the FLUMZ land use planning should cover a timeframe of between 5 to 10 years, but the PFALUPAM team inform the village meeting that this FLUMZ plan can be considered as a draft for the village to pilot, and it will be monitored over the first 1 to 3 years (see Tool 4.1) and, if necessary, it can be revised.

**Activity 10: Develop official letter to approve the village forest and land use management zone (FLUMZ) plan:**

Upon finishing the presentation in the meeting on village’s FLUMZ plan, then the Village PFALUPAM committee can proceed to draft the official village acceptant letter and proposal letter to submit to District Governor for approve, or:


- 1) the Village PFALUPAM committee can wait until the PFALUPAM technca team takes the maps and data back to the office, to tidy up and provided a clean version of the plan and data, for the village to review one more time, before proposing to the District Governor to approve, or
- 2) the village PFALUPAM committee can wait until the FLUMZ plan has been piloted and implemented for 1 to 3 years, after which the lessons learned, and the progressively well managed, reviewed and monitored (see Tool 4.1) then revised and/or improved the FLUMZ plan which is more comfortable in proposing to the District Governor to approve.


**Step 3: Review and development of regulation for managing the use of agriculture land and forest resources according to FLUMZ plan:**

As the growing rate of population and investment projects increased actually associated with the use of agricultural land and forests is increasing too, but the use of land in the villages are still lacking of management regulation on forest and agricultural land use as well as to make sustainable protection of natural resources; for this reason, we consider that the rules or regulation on governance and management of natural resources and using of village agricultural land and forest is very necessary and very important to develop according to the forest and land use management zone (FLUMZ) as key role to develop and upgrade the quality of life of villagers to enriching improved wealth from the use of agricultural land and natural forest resources.

Therefore, in this process, the method of reviewing and revising/developing the village regulation on natural resource and agricultural land use management will be identified as an important obligation tool or component in the Participatory Forest and Agriculture Land Use Planning, Allocation and Management (PFALUAM) approach.

**Objectives of village regulations for implementing village FLUMZ plan:**

-  To promote villager participation in, and increase their responsibility for the sustainable management and use of forest and agriculture land and resources.

-  To develop the participatory forest and agriculture land use management regulation at village level.

## 1. Important methods:

**Methods 1:** The PFALUPAM staff must ask the villagers about the details of existing regulation documents on natural resource and land use management. Also ask on indigenous knowledge in relation to regulation mentioned;

**Methods 2:** Then, the staff and villagers together make further discussion for improving such regulations for managing the use forest and agriculture land, by the integration of existing local knowledge for being suitable to the laws and real situation;

**Methods 3:** The staff must explain it once again to the village community to ensure they understood and agreed upon with all;

**Methods 4:** The staff facilitate the village administrative authority to present official proposal letter to the relevant district agencies for consideration and approval of the village regulations developed.

*Note: this may be done at the same time of requesting for approval of the village forest and land use management plan. Because this regulation is an integral part of FLUMZ Plan.*

**Methods 5:** After the District Governor issued the official approval on village FLUMZ plan, the PFALUPAM team will organize a village meeting to disseminate the FLUMZ plan and associated regulation to all villagers for aware and implementation.

## 2. Questions to improve the village regulation on management of natural resources and use of agricultural and forest land:

Details will be provided in Attachment 1: which are specifically provided for each relevant aspect, depending on the importance and necessity, it will include a total of 10 questions as summarized below:

**Question (Part 1):** On the principles and methods of creating/implementing existing village rules: In this group of questions will be an open and comprehensive questions about the principles and methods of establishing and implementing rules, including the system of governance and enforcement in the past to the present. In addition, there will be additional questions about incentives, issues, solutions and suggestions of ethnic villager in the village;

**Question (Part 2):** On the operation and transformation of forest land into agricultural land: Questions will cover all area of agricultural in sloping land including the forest area (conservation, protection, production and village forest areas);

**Question (Part 3):** On wet land: This category is about measurement to manage and use of wetland, water sources and riparian forest and also the obstructing of water flow (small barrage for fisheries);

**Question (Part 4):** On communication land: This section focuses on the maintenance and protection of all types of communication roads within the village administrative area;

**Question (Part 5):** On cultural land: This category includes the land for culture, tourism and scarify land area of the village;

**Question (Part 6):** On construction land: This section includes construction land and village plan for in town land development;

**Question (Part 7):** On management and use of timber: This section will cover areas for the management and use of timber, NTFP, and forest fire prevention and control;



**Question (Part 8):** Insights into the protection of aquatic and wildlife: This section focuses on the management and protection of aquatic and wildlife, including protected areas and controlling of wildlife hunting;

**Question (Part 9):** On livestock management: This category includes the management of all kind of livestock (poultry, small animals, large animals) e.g. the development of animal husbandry, livestock, prevent disease and movement;

**Question (Part 10):** On the defensive of chemicals pesticides and herbicides: This category is emphasized on how to protect and use of chemical pesticides and herbicides.

#### **Step 4: introduce and promote villagers to implement the forest and land use management zoning (FLUMZ) plan:**

Encourage and promote villager to implement the forest and land use management zone (FLUMZ) and give all content and information of the FLUMZ plans to all concerned organizations to aware and recognize to mainstream it into their strategy, action plan and program to provide supports – help villagers to be able to implement the FLUMZ plan and relevant development activities according local potential in sustainable manner.

#### **Stage 5: Follow-up on the implementation of the FLUMZ plan (field mission 4):**

The monitoring and evaluation of the implementation the forest and land use management zone (FLUMZ), is very important to sustain the efficiency and effectiveness of the development, management and use of agricultural land and forests of all villagers in the village. During operation of the inspection and evaluation of at least 2 times, the first times is at least 1 year after the developing the forest and land use management zone (FLUMZ) completed and given to villagers to follow in practice, and the second time is at 2-3 years later. The monitoring and evaluation are to take actions in each village for about 2 - 3 days in 1 village.

The conduction of monitoring and evaluation mission on the implementation of the forest and land use management zone (FLUMZ) is field mission of around 4 at the village and district levels that will include 4 important steps for actual works as detailed in below:

#### **Step 1: Prepare the team, information, maps and equipment:**

##### **1. Prepare the team work:**

The team work of who will conduct monitoring and evaluation mission on compliance implementation of FLUMZ plans is including as in following table:

No.	Position	Responsibilities
1	Team Leader	Responsible for the implementation of the overall monitoring work, especially working with the PFALUPAM task force.
2	GIS staff	Help villager to understand and use maps and explore real areas
3	GPS surveying and collecting staff	Help villager read maps and explore real areas
4	Socio-economic data collection staff	Collect and evaluate economic and social data

##### **2. Prepare the maps:**

Prior to the implementation of monitoring and evaluation in target village, the team must prepare and study of relevant maps (Table 1) for understanding the detailed of all information before taking real field monitoring activities, then updating the FLUMZ plan to be more realistic and accurate and suitable to local realities situation.

**Table 1. List of maps and scope**

No.	Maps and GIS information	Scope of application
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1.	Geo-Topo-VB	Ography Topography of the village
2.	Geo-SIM-VB	Plant cover conditions
3.	CLUFC	Current land use and forest cover after PFALUPAM Round 2
4.	Sim-CLUFC	Current land use compared to satellite imagery (during Round 2)
5.	Original FLUMZ map	Original FLUMZ maps and maps
6.	Map FLUMZ version update	Map FLUMZ amended (The Current Version)
7.	Map SIM-FLUMZ- photos Landsat or Sentinel	The latest upland agricultural production areas
8.	SIM-FLUMZ_SPOT or high-resolution images	Categories such as forest land, farm land including the crop industry

### 3. Prepare the forms:

The forms prepared for using in the monitoring and evaluation works on the implementation of the forest and land use management zone (FLUMZ) including data forms (new) for comparison such as: 1) the use and possession of the family ; 2) agricultural land, especially upland agriculture ; 3) forest land area ; 4) records/notes of agricultural and forestry land surveys; and 5) information on the use of permanent (individual) agricultural land in the total land area or village land.

### 4. Prepare the equipment:

All necessity equipment must be prepared for using in work at target villages: pin, cotton, color stickers, notebooks, pens, envelope paper, paper A0, scotch tape, printer paper, ink and projectors (LCD), GPS, batteries, plugs and others:

## Step 2: Monitoring/evaluation and update the forest and land use management zone (FLUMZ):

### 1. Village selection criteria:

A village that already completed the PFALUPAM at round 3 and the villager using or operating the forest and land use management zone (FLUMZ) over 1 year already.

### 2. Duration of work at village:

Working time on monitoring and evaluation of the compliance of the forest and land use management zone (FLUMZ) at village should be at between October to February before seasonal crop production (upland rice) which would take 2-3 days per village based on several characteristics of village, such as: land use systems, the size of land use, the level of consistency of compliance according to FLUMZ plan and level of villagers participation.

### 3. Review and evaluate the initial data:

- 1) Review the data on management of land use and forestry, especially in upland rotation cultivation area of the village by comparing the data in the forest and land use management zone (FLUMZ) plan with the satellite imagery data for: 1) examine the area and cycle (year) of land use for agricultural crops, 2) assess the area of agricultural land and the need of land for cultivation of the villager, as well as the reasons that may lead to an expansion of agricultural land in other types of land, and 3) evaluate on organizational management for agricultural production, such as production groups, land use areas, and land use cycles;
- 2) Use the high-resolution photos aerial to check the operations of agricultural production, the construction or other activities occurring outside the FLUMZ plan after the forest and land use management zone (FLUMZ) was developed; and
- 3) Identify or record the changes of land use on the maps for using as reference to the discussion and conducting surveys in the field with villagers.

#### **4. Activities to do at village:**

##### **1) Meeting with the village PFALUPAM committee in order to:**

- A) Report the results on implementation of the agricultural and forestry land use management zoning (FLUMZ) plan;
- B) Present to the village PFALUPAM committee on latest satellite imagery data map and indicate the land use in upland area in the past years by emphasizing indication on the point that is not lie in the FLUMZ plan;
- C) Report the names of the families who could not comply with the FLUMZ plan (use the land outside the FLUMZ plan) and install that information on satellite imagery maps.

##### **2) Meeting with villagers in target village:**

- Present the results of the meeting with the village PFALUPAM committee and facilitate the villagers to provide truthfully comments;
- If there is a family do farming outside the FLUMZ area (or did not follow the FLUMZ plan) in the previous year, that family should indicate the area used and explain the reasons, and plan to use of the land and the types of crops to be planted in the upland at next year;
- Mark the family code or write the family name on a piece of paper or sticker to paste on the map and record form according to the information provided by the villagers.

##### **3) Conduct field survey:**

The field team will conduct field survey for verification again with ethnicity villagers if there is a case that villagers did not yet understood or agreed with the results of the initial monitoring and evaluation practice or the comparison between the assessment results and the satellite imagery is not clear.

##### **4) Summarize of information and reporting:**

Summary, reporting and use the information into dialogue and field survey for updating the FLUMZ plan and maps before recording that information in the database.

##### **5) Information certification:**

Certify the data by: 1) meeting with villagers to present on the changes, update or edit the information in the FLUMZ plan and maps and introduction on using the land for cultivation in the upland, 2) indicate the names of family on FLUMZ map then notify or inform such family and all villagers to aware in the meeting room. In case of community and village authorities have common agreement to allow such family to continue to keep the land use in the commune agricultural of village, 3) leave villagers to ask questions to clarify of information or to resolve the grievances and listen to relevant proposals or opinions, 4) record and present the results of the meeting (including the future FLUMZ plan) to villagers to recognize, understand and agree before the village authorities sign for acceptance, and 5) use the information that has been unanimously approved by the villager to develop the FLUMZ plan and maps (as final version) before printing out as a book and producing it as a map signboard.

### **Step 3: Meeting for approving and endorsing the village FLUMZ plan at district level:**

To present the forest and land use management zone (FLUMZ) plan to the village, cluster village and district authorities to make consideration, certify and approve it as reference to villagers to follow in implementation. The tasks to organize this meeting are detailed in below:

#### **1. Preparation:**

##### **1) Participants:**

Participants of the meeting to adopt the FLUMZ plan at the district office should be: village PFALUPAM committee, head/deputy of village, head/deputy of cluster village, PFALUPAM team (Central, Province, district), head/deputy of DAFO, head/deputy of DONRE, head/deputy of the District Governor Office, head/deputy of District Justice Office and the District Major or deputy (the meeting may be co-chaired with the head/deputy of PAFO and the head/deputy of DALaMD).

##### **2) Location:**

Arrange the meeting in a place that is convenient for the participants to attend, which may be at the meeting room of cluster village or at meeting hall of village located in the center point from each villages surrounded.

##### **3) Meeting agenda:**

The Agenda of the meeting to approve the village forest and land use management zone (FLUMZ) plan at district level must be drafted by the PFALUPAM team and the DAFO will be the master of meeting and chaired by the District Governor or deputy (the meeting may be co-chaired with the head/deputy of PAFO and the head/deputy of DALaMD)

##### **4) Tools and equipment:**

Necessary and indispensable tools and equipment for the meeting include:

- Book plan of the village forest and land use management zone (FLUMZ);
- FLUMZ maps;
- A0 consolidated map (for recording meetings);
- Presentation report on analysis of land use, according to the village forest and land use management zone (FLUMZ). Printed out for distributing to participants from the province, district and for every concerned villages.

##### **5) Presentation papers:**

Proposals and copies of documents to be presented and distributed to the participants of the meeting should include specific topics as below:

- A) Overall overview of all villages in the cluster, total land use in the cluster, the number of villages that was monitored and evaluated on the implementation of the village forest and land use management zone (FLUMZ),
- B) Compile all village maps within the cluster, such as:
  - GeoSIM satellite imagery maps (pre-allocated);
  - CLUFC current land use map (pre-allocation);
  - FLUMZ allocation map (revised);
  - SIM allocation map - FLUMZ (with the latest snapshot comparable to the allocation map);
  - The latest snapshots prepared as a basis for monitoring and evaluation;

- C) Summarize the results of participatory observation, analysis and evaluation report of the technical team in collaboration with the village PFALUPAM committee and the village authorities.

## **2. Conduct the meetings:**

After officially opening the meeting, the representative of the PFALUPAM team starts to present the overview on the results of M&E analysis on implementation of the village forest and land use management zone (FLUMZ) by based on comparison with the data in current photo aerial.

For the discussion, it is to divide in two working groups (2 villages per group) for review the FLUMZ plan and maps, the results of M&E and answer to the questions about:

- Method of using and period of using village FLUMZ plan;
- Advantages and benefits from the implementation of village FLUMZ plan;
- Issues and challenges occurred into the implementation of village FLUMZ plan;
- Directions to solve the problems-challenges and guideline to update village FLUMZ plan.

## **3. Assessment of the meeting results:**

The results of meeting would be based on the outcomes from the review and analysis of the implementation of the village forest and land use management zone (FLUMZ) plan, by comparison with related photography and comments gained from the village administration authority and all sectors concerned. The results of the meeting will be used for enhance the strengths, address the weakness and improvement the village forest and land use management zone (FLUMZ) plan in future in order to be able and guarantee the sustainable implementation with high effectiveness and efficiency.

## **Step 4: Hand over the FLUMZ book and post the FLUMZ map sign boards at village sites:**

After completing the improvement of village forest and land use management zone (FLUMZ) plan and FLUMZ maps as final version according to village proposed and according to the common agreement and results from the meeting at district level (in step 3 of this stage), then print out and make as FLUMZ plan books and maps with sufficient numbers for distribute to all stakeholders at the village/cluster village, district, province and central organization to use it.

The district authorities (District Governor) hand over the FLUMZ books and maps sign boards to villages (assuming that the implementation of PFALUPAM was official performed). during the handover ceremony, the technical team should re-explain about how to use FLUMZ plan and maps again in order to make villagers to have better understanding all contents and also to introduce villagers to take FLUMZ plan and maps as reference base into the real implementation activities in the village and surrounding villages for creating favorable conditions into the development of agro-biodiversity effectively, efficiently and sustainable.

If the villagers can effectively follow to implement the village FLUMZ plan accurately and generate good outcomes, with peace and solidarity, thus continue to facilitate the relevant GoL organizations to issue the land use certification (for village commune land and family land) then further to issue the final official land titling in future.

## **Annexes:**

- Annex I : **Data Collection Forms**
- Annex II: **How to use some forms for data collection**
- Annex III: **Draft proposal and approval documents for FLUMZ**
- Annex IV: **Survey and assessment of soil fertility**
- Annex V: **Land use classification system and color code**



# ANNEXES

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**Annex I: Data Collection Form s**

**Annex II: How to use some Form s for data collection**

**Annex III: Draft proposal and approval documents for FLUMZ**

**Annex IV: Survey and assessment of soil fertility**

**Annex V: Land use classification system and color code**

## Annex I: Data Collection Form s

**Table list of all Data collection Form s to be used in PFALUPAM at target village  
(round 1 - 4)**

Form No.	Name the Form and draft of the document	Comment
<b>I</b>	<b>Round 1 data collection Form</b>	
1	Form 1: Village Profiles (general village information)	Village level
2	Form 2: Agro Ecosystem analysis (simple)	Village level
3	Form 3: Cropping profiles and calendars	Village level
4	Form 4.1: NTFPs gathering, use, status etc	Village level
5	Form 4.2: NTFPs priority (for forest and gardens)	Village level
6	Form 5.1: Wood gathering, use, status etc	Village level
7	Form 5.2: Wood priority (for forest and gardens)	Village level
8	Form 6: Wildlife	Village level
9	Form 7: Fish and Aquatic products	Village level
10	Form 8: Problems re Agric and Forestry	Village level
11	Form 9: Village development potential and priorities	Village to village
<b>II</b>	<b>Round 2 data collection Form</b>	
12	Form 10: Population, rice requirement and livestock	Family level
13	Form 11: HH level income (approximate value, sources)	Family level
14	Form(s) 12: Land tenure, claims, use, production (each HH)	Family level
15	Record soil samples	Village level
16	Save space exploration agriculture and forestry in the deal now	Village level
<b>III</b>	<b>Round 3 data collection Form</b>	
17	Record area of agricultural land allocation and management	Village level
18	Data management zones and the use of forest land	Village level
19	Record the coordinates of the allocation area according to the agricultural and forestry land use plan	Village level
20	Review and update the rules governing the use of agricultural land and forests of village	Village level
<b>IV</b>	<b>Round 4 data collection Form</b>	
21	Monitoring and evaluation of PFALUPAM implementation outcomes	Village level

## Form 1: Village Profile (initial interview with village admin)

1. Village name		Cluster village		District	
Interviewer		Recorder		Date	
2. Village history					

### 3.1 Population, rice needed for consumption, ethnicity and occupation

3.1	N. HH		N. HH		N. person	
3.2	Sufficient		Insufficient		Insufficient month	
3.3	Ethnic:	HH	Ethnic:	HH	Ethnic:	HH
	Ethnic:	HH	Ethnic:	HH	Ethnic:	HH

### 3.2 Population changes during the past 10-20 years

Year >>							
N. HH							
N. population							

### 3.3 Occupation (number of household)

Upland rice		Garden		Merchant		Handicraft		Public service	
Paddy rice		Livestock		Employee		Transport		Soldier	

### 4. Infrastructure (number of household)

Electricity. HH (exist or not)		Water supply HH		Primary school (exist or not)		Temple (Nr.)	
Local light (exist or not)		Natural water supply HH		Secondary school (exist or not)		Religious	
Water wheel electricity (exist or not)		Water bore HH		Village hall (exist or not)			
		River HH		WC room HH			

### 5. Vehicle (total in village)

6 wheels truck		Pick up		Kubota		Pirogue		Transport ship	
4 wheels truck		Van		Trucktor		Board			

### 6. Livestock management and number of livestock:

Cattle		Poultry		Goath		Fish pond	
Buffalos		Pig		Horse		N. of fish released	

### 7. Crop production

	Paddy	Upland rice	Upland crop	Permanent garden	Fruit tree	Industrial tree	other
Hectare							
N. household							
Type	Yearly				Tree garden		

**8. Land tax**

	Type of land	Tax rate	Reason

**9. Previous land use allocation**

Year developed		By who	
Has data or map?			
Still in use?			

**10. Contract farming, land concession and other**

1	There is a contract farming?	
2	There is land concession?	
3	Farmer group?	
4	Maarketting arrangement?	

**11. Development project on agriculture and forestry in the village**

No	Name of the project	Activities

**Form 2: Agro-Biodiversity information****1: Agriculture****1.1: Number of households cultivate paddy, upland and average area?**

	Paddy rice	Upland rice	Upland crop	Do both	Do nothing
N. of person in HH					

**1.2: Name and crop species**

	Paddy rice specie	Improved or local species	Steam or sticky rice	Yearly or shorter		Upland rice species	Improved or local species	Steam or sticky rice	Yearly or shorter

**1.3: Another crop**

	Name of upland plants	sale	eat		Name of other upland plants	sale	eat
	Name of lowland plants	sale	eat		Name of other lowland plants	sale	eat

#### 1.4 Problem on production

##### 1.4.1: Specie: problem and potential

Crop specie	Problem	Potential

##### 1.4.2: Problem on vegetation: cultivation, management and harvest

Problem on plantation	Problem on management	Problem on harvesting

##### 1.4.3: Characteristic and type of village soil

Land type	Location	Suitable for what crop	Problem

##### 1.4.4: Pest and disease problem

Pest or disease	Problem	Impact

#### 1.5 Upland cropping

##### 1.5.1 Period of rotation cycle

	Question	Answer
1	How many year olds of the upland rotation practiced period at the past 20-30 years	
2	How many year olds of the upland rotation practiced period at present	
3	How many year of rotation that villager preferred to be	

##### 1.5.2: Suitable of Fallow

	Type	No. year rotation for use	Suitable crop species

##### 1.5.3: Condition or factor to select upland area for cropping for each year

	Factors	Reason
1	Age of fallow	
2	Type of fallow	
3	Soil condition	
4	Land use right	
5	Permission before clearing the fallow	
6	Another factor	

##### 1.5.4: Upland rice cultivating system

How to organize and manage, it is a group in one big plot or individual family small and separated plots


## 2: Livestock management

### 2.1: Location

	Wet season		Dry season	
	Location	Rule	Location	Rule
Cattle				
Buffalos				
Other				

## 2.2: Grass plantation land

		Plantation grass		Natural grass	
		N. HH	Grass species	N. HH	Grass speies
	N. HH growing forrage				

## 2.3: Vaccination and animal disease

No	disease	season	reason	N. HH has vaccination	N. HH has not vaccination

## 3. Forest area

### 3.1: Forest area that has never been cleared or never been used for agriculture production

Name of forest	LOcation	Type of forest	Why it was protected	Forest cover (%)

### 3.2: Forest type and products inside the village forest area

Forest type ((local name)	Location	Main kind od product	Remark

### 3.3: Bamboo forest

Name of bamboo	Location	Purpose of use	Forest history

### 3.4: Tree or NTFP plantation garden

Specie	LOcation	N. HH plantation	Ownership

## Form 3: Situation and calendar for plantation of main economic crop of village

### 1. Calendar of main economic crop of village

Crop specie	Land preparation (month)	Plantation (month)	Water source	Cropping		Fertilizing		Weeding		Pest and disease control		Harvesting	
				Method	N. working day	Type	rate	Method	N. working day	Method	N. working day	Month	Method

### 2. Investment capital for the production of main economic crop of village (average per hectare)

Item	quantity	Unit price	Amount	Remark
Specie				
- Seed				
- Land preparing				
- Maintenance				
- Fertilizer				
- Harvesting				
- Milling				
- Transportation				
- Another				
Average yield:                      tone/ha. Unit price:                      Kip/kg				



### Form 4: NTFP priorities, status and harvesting

**Form 4.1: Collection of NTFP information on harvesting and status: User inForm ant female >30% of total HH**

**Village:**


**District:**


Date:

\_\_\_\_\_

**Ethnic 1:**

10

HH

**Cluster village:**

--	--

**Province:**

--	--

**Recorder:**

[illegible]

**Ethnic 2:**

--	--

HH

**Ethnic 3:**

--	--

HH

Total

--	--

HH

		Objective				NTFP harvested and income														
No	Species (local name)	Sale	Consume	Food	Medicine	N.HH harvest	Unit	Quatity per HH	Quantit y per village	HH sale	Total sold per HH	Total sold per village	Amout. HH	Amount Village	Area harvested	Long way from village(minutes)	Forest type	Situation (a lot or few)	Changed in 5 years past	Reason of changed
	1	2	3	4	5	6	7	8	9 (6x8)	10	11	12(10x11)	13	14 (12x13)	15	16	17	18	19	20
<u>Remark:</u> for (i) mushroom and (ii) Bamboo shoot should identify clearly each specie, and collect te data on honey too																				

**Form 4.2: Endangered NTFP and priority specie for development**

Village

Cluster

District

Proince

Date

Recorder

**1: Endangered specie**

Specie (local name)	When it dissapeared	Reason

**2. Priority NTFP for development****2.1 NTFP species needed to be planted and managed (in forest)**

Specie (local name)	N. HH	Reason	Method

**2.2 NTFP species needed to be plan in garden**

Specie (local name)	N. HH	Reason	Method

## Form 5: Wood: harvest, use and priority

### Form 5.1: Collection of wood information on harvesting and use: User informant female >30% of total HH

Village:	<input type="text"/>	District:	<input type="text"/>	Date:	<input type="text"/>	Ethnic 1:	<input type="text"/>	HH
Cluster village:	<input type="text"/>	Province:	<input type="text"/>	Recorder:	<input type="text"/>	Ethnic 2:	<input type="text"/>	HH
						Ethnic 3:	<input type="text"/>	HH
						Total	<input type="text"/>	HH

		Objective				Wood harvested and income															
No	Species (local name)	Sale	Consume	Food	Medicine	N.HH harvest	Unit	Quatity per HH	Quantity per village	HH sale	Total sold per HH	Total sold per village	Amount t. HH	Amount Village	Area harvested	Long way from village(mi nutes)	Forest type	Situation (a lot or few)	Changed in 5 years past	Reason changed	of
	1	2	3	4	5	6	7	8	9 (6x8)	10	11	12(11x12)	13	14 (12x13)	15	16	17	18	19	20	
Total village income																					

## Form 5.2: Priority wood

Village

Cluster

District

Province

Date

Recorder

### 1: Endangered wood

Specie (local name)	When it dissapeared	Reason

### 2. Priority wood for development

#### 2.1 Wood species needed to be planted and managed (in forest)

Specie (local name)	N. HH	Reason	Method

#### 2.2 Wood species needed to be plan in garden

Specie (local name)	N. HH	Reason	Method

## Form 6: Wild life

User inForm ant female >30% of total HH

Village		District		Date	
Cluster village		Province		Recorder	

	name of wildlife	location observed	Forest/land type	Travel time (minute)	no. HH 'use'	Status	% change in last 5 years	Reason for change
	1	2	3	4	5	6	7	8

list of wildlife that has become extinct over the last 20 years

nr.	Species	English	Scientific name	Nr. years extinct	Reason for extinction	nr.

## Form 7: Aquatic

Village		District		Date	
Cluster village		Province		Recorder	

Numeric marks: 3 (many), 2 (medium) and (few)

name of river or stream, Quantity gathered: 3, 2 or 1						Status	% change last 5 yrs.	Reason for change
No.	name of species					name of species		

List of aquatic species that have become extinct over the last 20 years

No.	Name	Specie	Nr. years extinct	Reason for extinction	English	Scientific name

## Form 8: Problem Census and basic analysis

User informant female >30% of total HH

<b>Village:</b>		<b>District:</b>	<b>Date/month/year:</b>	<b>No. informants (female):</b>
<b>Cluster village:</b>		<b>Province:</b>	<b>Recorder:</b>	<b>No. informants (male):</b>
<b>No.</b>	<b>Sector, , and problem</b>	<b>reason for problem</b>	<b>impact of problem</b>	<b>proposed/possible ways to resolve</b>
<b>1</b>	1: regarding use and management of timber:			
<b>2</b>	2: regarding use and management of NTFP:			
<b>3</b>	3: regarding use and management of fish			
<b>4</b>	4: regarding use and management of wildlife			
<b>5</b>	5: regarding cropping in wet rice fields			
<b>6</b>	6: regarding cropping in upland fields			
<b>7</b>	7: regarding planting of crops			
<b>8</b>	8: regarding orchard and plantation crops			
<b>9</b>	9: regarding livestock raising			
<b>10</b>	10: regarding management of Agric and Forestry Land			
<b>11</b>	11: regarding selling and marketing			
<b>12</b>	12: regarding water for drinking and use			
<b>13</b>	13: regarding health			
<b>14</b>	14: other issues/problems			

## Form 9: Potential and Proposal for Village Development

User informant female >30% of total HH

Village:		District:	Date/month/year:
Cluster village:		Province:	Recorder:
No.	Sector/ development activity	location	Any special pre-conditions or potential
1	Forestry		
2	Agriculture		
3	Livestock		
4	Health		
5	Infrastructure		
6	Other		

## Form 10: Important geography location of village

Village		District		Date			
Cluster village		Province		Recorder:			
No.	Name of location	Horizontal (X)	Vertical (Y)	Elevation	Truth	Photo no.	Explain
	1	2	3	4	5	6	7

## Form 11: Village boundary location

Village		District		Date				
Cluster village		Province		Recorder				
No.	Name of location	Horizontal (X)	Vertical (Y)	Elevation	Truth	Photo no.	Explain	No.
	1	2	3	4	5	6	7	8



**Form 12: Record of households, population, occupation, rice requirement and livestock holdings**

<b>Village</b>		<b>Province</b>	
<b>Goomban</b>		<b>District</b>	

Name of collector:

Date:

**PS: Printed on legal size paper**

[illegible]

Village		District		Date					
Cluster									
village		Province		Recorder		Period	month	to	month

[illegible]

**Form 14:** household land use and production, Claims and Ownership

Village  Cluster village  District  Province  Recorder   
Date

Unit	house	Nr	husband	wife	plot	location	Area ha	use (crop)	year	production g/yr	Future use	Fixed or rotation	Origin of land	Land document	comment
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

## Form 15: Record of information on Soil Sample, auger and pit

### I. Location and Environment of Soil Auger Sample site:

Soil sample no.....; day, month, year.....; climatic conditions.....

Village:....., village cluster....., district....., Province:.....

Location in vilage:.....

North Longitude.....; East lattitude.....

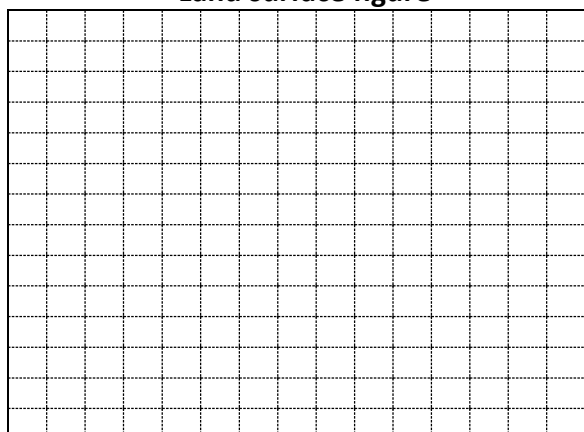
Surface and slope: flat or quite flat 0-2%(a), up and down 2-8%(b), wave 8-16%(c), slope 16-30%(d), heavy slop 30-55%(e), high mountainous slop >55% (f)

Direction of slope.....; elevetion.....

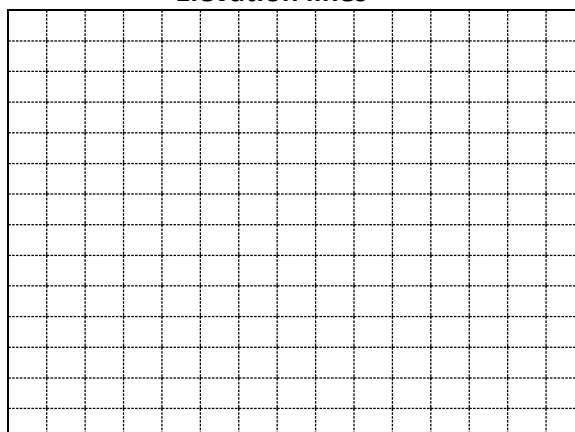
Water drainage: non-applicable, minimum, moderate, good, very good; soil erosion: minimum, moderate, high/severe

Land surface: cracks.....; stone.....; others.....

**Land surface figure**



**Elevation lines**



Natural vegetation.....

Planted crops.....; planting conditions.....

Assessment of appropriateness, land use situation, soils problem.....

Underground water level.....; originated rock/materials.....

Local name of soil.....

Name of soil identified during field survey.....

Recorded by.....

## II. Description of different soil layers (from soil pot)

Soil strata							
Depth of soil strata							
Division point of soil strata							
color	When dried						
	When wet						
Surface							
Soil moisture							
Organic volume							
Structure	Physical						
	Tolerant level						
	Dimension						
Clay density	Dry						
	Moisture						
	Wet						
ຈຸດປ່າມ	Volume						
	Dimension						
	Color						
Rock Fe, Mn	Volume						
	Dimension						
	Physical						
Dilution with rock	Volume						
	Dimension						
Limestone (CaCO <sub>3</sub> )							
Salts							
Crack line	Width						
	Depth						
Tree roots/grass/ other plants	Volume						
	Dimension						
	Features						
Space	Volume						
	Dimension						
	Physical						
Biodiversity	Quantity						
	Types						
pH H <sub>2</sub> O							

### Form 16: recording GPS survey of geographical

Village		District		Date ឆ្នាំ ខែ ថ្ងៃ:	
Cluster village		Province		Recorder:	

nr.	deviation	elevation	X-coordinate	Y-coordinate	Point taken??	Photo nr.	Type of forest or land use	Description of point, feature
	1	2	3	4	5	6	7	8

## Form 17: Agricultural Zone Profile

Record/List each Agriculture Land Use Zone in the Village FLUMZ Plan

Area code	Name of area that villager will manage and reserve for production at each year	location	Area (ha)	Tenure

### Profile of Agriculture Land Zone

<b>ZONE code</b>		<b>Village:</b>		<b>Cluster:</b>		<b>District</b>		<b>Date:</b>	
<b>1: Name of Agriculture Zone: (local name)</b>									
<b>2: Location of Zone</b>									
<i>Remark: the team has to record this plot of agriculture land use zone to indicate its location in which mountain, what are the river and other existing natural/geography structure what is about??</i>									
<b>3: Description of the boundary of the zone (place to place)</b>									
<b>4: Reason and objective of villagers to decide to classify it as agricultural production zone</b>									
<b>5: Historical (to current) land use and Management of this Zone</b>									
	<b>Land Use -Management (select 1 or 2)</b>					<b>Yes/No</b>	<b>Additional explanation</b>		
<b>1</b>	It is all bush fallow, previously cropped by villages, and mainly old bush fallow								
<b>2</b>	It is all bush fallow, previously cropped by villages, and mainly young bush fallow								
<b>3</b>	It is mixed bush fallow with some current upland crop fields								
<b>4</b>	It is degraded forest								
<b>5</b>	Other (please explain)								
<b>6: Description of the Zone soil, topography, etc</b>									
	<b>Site Characteristics</b>					<b>Additional details</b>			
<b>1</b>	Average slope, topography								
<b>2</b>	Soil type: villagers								
<b>3</b>	Soil type: staff								
<b>4</b>	Uniformity of soils in the zone								
<b>5</b>	Any un-usable land, and why ?								
<b>6</b>	Access to the zone ?								
<b>7</b>	other								
<b>7: results of soil testing and analysis, if any</b>									
Depth		P		N					
layers		K		%OM					
<b>8: Product planned to grow/harvest from this Agriculture Land Zone</b>									
	<b>Crop species to be grown</b>						<b>comment</b>		
<b>1</b>									
<b>2</b>									
<b>3</b>									
<b>4</b>									
<b>9: families currently/already using or claiming land in this zone (cross check with Form 12)</b>									



No	Family name	Land use	Area	History of use	No	Family name	Land use	Area	History of use

**10: What is the strategy of the village to allocate land to household with this zone**

**11: What is the strategy or plan to control fire in this zone ?**

**12: Any specific regulations specific to this zone ??**

### Form 18: Information on each Forest Land Zone

Record/List each Forest Land Use Zone in the Village FLUMZ Plan

Area code	Name of area that villager will manage and reserve as Forest	location	Area (ha)	Tenure

### Profile of Forest Land Zone

Zone Code		Village:		Cluster:		District		Date	
<b>1: Name of forest land zone: (local name)</b>									
<i>Remark: write the name of that forest land use zone as villagers usually call it. This name can be a name combining (a) the geography location of the area, and/or (b) the objective of that forest zone</i>									
<b>2: Geographical Location of this Forest Zone</b>									
<i>Remark: the team has to record the geographical location of that forest zone (even if already in the name ?) eg, what mountain, river, or other natural feature that can be seen, or is noted on the village geo maps</i>									
<b>3: Description of the boundary of the zone</b>									
<b>4: Reason and objective: that villagers decided to Zone this area as Forest</b>									
<b>5 Land use situation in that zone since the past till present</b>									
<b>5.1: Current management/ use of the land</b>								<b>Yes/No</b>	<b>Details</b>
<b>1</b>	currently it is forest that villagers have and will continue to maintain/manage as a "forest".								
<b>2</b>	it is an area containing both forest and also some upland cropping land and bush fallow.								
<b>3</b>	mainly area of upland crop land and bush fallow								

<b>4</b>	mainly fixed agriculture land								
<b>5</b>	it is neither forest or agriculture - explain								
<b>5.2: In case of answer item i or ii above,</b> write details on forest structure, type of forest									
<i>Example: Dry forest, Pine forest, Bamboo forest, Riparian forest, all the year green forest/virgin forest and etc...</i>									
<b>5.3: In case of ii, iii or iv:</b> How do villagers plan to <b>convert</b> Agricultural land to Forest ?									
Regenerate as natural forest									
Plantation forest									
Other									
<b>6: Types of Forest Products collected, or expected to get, from this Forest Land Zone</b>									
	<b>Type of Forest Product or land Use Activity</b>			<b>Yes/No</b>	<b>Details of type/ additional information</b>				
<b>1</b>	Construction wood								
<b>2</b>	Bamboo wood for construction or handicraft								
<b>3</b>	Fire wood								
<b>4</b>	Bamboo for collecting of shoot								
<b>5</b>	NTFP....for sale ? for food..? for other ...??								
<b>6</b>	Wildlife								
<b>7</b>	Fish and other aquatic animal								
<b>8</b>	Livestock razing								
<b>9</b>	Other product or use activity								
<b>7.1: In case of section 5.1 (ii) to (v) above [ the area proposed to be zoned as forest is currently agricultural land use ] then list names of families who crop in this zone (cross check with Form 12).</b>									
<b>No</b>	<b>Family name</b>	<b>Land use</b>	<b>Area</b>	<b>History of use</b>	<b>Nr</b>	<b>Family name</b>	<b>Land use</b>	<b>Area</b>	<b>History of use</b>
<b>7.2: How will the village resolve the issue of families using land in an area now zoned as Forest Land ??</b>									
<b>8: what is the plan or strategy to control forest fire in this zone</b>									
<b>9: Proposed Regulations specific for this zone</b>									
<b>Re timber:</b>									
<b>Re. NTFP:</b>									
<b>Re. Wildlife:</b>									
<b>Re. Grazing:</b>									

## Form 19: : recording GPS survey of Forest and Land use

Village		Province		date of date collection	
Vill Cluster		District		name of data collectors	

[illegible]

**Form 20:** Questions to facilitate the review and development of forest and agriculture land and resource management regulation

**Question 1.** Opening Query

- 1: Can you tell us about the past and current methods or systems for managing of village forest and agriculture land?
- 2: Is there a real (and followed) land use management plan/process in the village ?
- 3: Is there any previously written rules and regulations ?

If yes, then the villagers should give this document to the FALUPAM team, who will then read it back to the meeting

**4: Management Committee:**

- Is there a specific responsibility committee for management of land and natural resources?
- If yes, who is on the committee, and when the committee was established and was it approved, and by whom?
- Is this committee motivated or active? and what problems faced into motivation
- What are this committee's main role, and how about their decision-making process?

**5: Motivations to follow village regulations**

- What are the problems faced in motivating village to follow regulations?
- How to resolve such lack of motivation or other weakness's in relation to regulations?

**Question 2.** Agriculture Land, as conversion of Forest to Agricultural Land

- 1: In case of people clear the forest, or bush fallow, for agriculture without permission from village responsibility committee, or preparing the cultivation land outside of the area allocated, what is the regulation to discipline that person?
- 2: In case of people wrongly clear the forest/land (above) but do not continue to plant crops on that land, what is about the regulation to discipline that person?
- 3: In case of there new families resettling to live in the village, what is the decision for allocating the agriculture land to them.
- 4: In case of a newly married family, what is the decision for allocating the agriculture land to them.
- 5: In case of people sold the upland bush-fallow land without any permission from village responsible committee, what disciplinary measure is taken?
- 6: In the case of outside persons encroaching and clearing village forest and agriculture land, what is about the method to discipline them?
- 7: In the case of persons encroaching (clearing) forest zoned as 'village forests', such as village conservation, protection and utilization forests, what is method to discipline that person?

**Question 3.** Wetland

1. What is the method for managing the wetlands?
  - Is there any zonation of watershed forest or riparian forest for soil erosion control, and protection of water for consumption?
  - In cases of people polluting the water (throw the waste, dead animal into the water etc.) what is the disciplinary measure taken?
2. What is about the methods for using land next to or in the wetland?
  - For those persons who cultivate the land along river side or close to wetlands, is there are regulation for the protection of soil erosion?
  - Is there any regulations or prohibition rule regarding the making of barriers to water flow (weirs to divert water, fully blocking fish traps?)

**Question 4.** Communication Land

1. What is the method and management of communication land – roads and tracks ?
  - For the main roads of the district, province and national, how many meters far from the road is agriculture land is allowed to be cultivated, in order to protect soil erosion?
  - Is there any regulation re. livestock roaming in the road?
  - Is there any regulation re. waste throwing out along the road?
  - Is there any regulation regarding the construction of barriers, buildings, wood stocks, drying products etc along the road side?
  - What is method to discipline persons who violate these regulations?

**Question 5.** Culture Land

1. What is the method and regulations for managing the community cultural land?
  - What is about method for managing the village sacred forest?
  - If there is any encroachment and clearing, what disciplinary measure is taken?

**Question 6.** Construction Land

- 1) What is method and regulations for managing construction land?

**Question 7.** Forest Management and Use

**Zonation**

- Is there any forest area that is conserved for the protection and management of plant species, such as medicinal NTFPs or other?
- Is there any forest area that is conserved and managed because it is a watershed, and watershed of what - village water supply, irrigation?
- Is there any forest area that is conserved and managed for the protection of wildlife? and if so, please explain.
- Is there any forest area that is conserved and managed for timber extraction?
- Is there any other forest or natural area that is conserved and managed, and for what purpose?

### **Timber extraction**

- What is method and regulations for managing **tree cutting and logging** in village forests?
- Which wood species are allowed to cut at village level? Or which wood species that are not allowed to cut?
- Must the cutting of trees for house construction, fencing, fuel wood, charcoal and other uses be approved by the village forester? or the Head of Village Administrative? or not at all?
- Under what condition is the approval given?
- In the village utilization forest, if logging is allowed and is undertaken, is there a plan for re-planting?
- In cases of illegal logging, what is method to discipline the violator? and what is the fine (or: when persons cutting large trees in the village conservation and protection forests, what is method to discipline that person?)

### **NTFP**

- What is method and regulations for managing **NTFP harvest** from the forest?
- Before villages go to gather NTFPs, do they have to get permission? Do they actually seek permission?
- Are there any species of NTFPS that are prohibited?
- Is there any prescribed NTFP harvest method, for specific NTFPs?
- Is there any system of quotas for the gathering of which NTFPs?
- Are there any NTFPs forest areas that are claimed by specific households?
- Is there any production of seedlings, such as trees, NTFPs etc, in the village - for replanting and regeneration?

### **Forest fire control**

- 1: Is there any village regulations and/or a process for the prevention and control of forest fire?  
Are these regulations written down.
- 2: Are there any methods, or system, to warn villagers about forest fire danger?
- 3: Is there any regulations about the firing of upland fields?
- 4: Are there forest fire control lines developed, and what are the development methods?
- 5: Are there volunteers responsible for management and protection of forest fire at village level?
- 6: Is there any collaboration activities with neighboring villages, during the upland field/bush fallow preparation (burning) period, in order to prevent fallow/forest fire?
- 7: In case of a fire started by a person breaches, or escapes, their land, and burns the forest and/or the fallows, because they did not pay attention or did not make forest fire control lines, what is method to discipline such a violator?

### **Question 8.** Protection of Aquatic Animal and Wild Life

What is the method and regulations for the management and protection of aquatic animal and wild life species?

#### **Aquatic**

- Are there any fish conservation zones in the village ?
- Are there any regulations for the management of this FCZ ? and what are they ?
- Are the FCZ regulations followed, and what is the fine for breaking the regulations ?
- Is there any controls or regulations on fishing, in general (and outside the FCZ) ?
- Are there any regulations re. the timing of fishing ? or about fishing gear ?
- What is the fine etc for breaking the regulations ?
- What are the names/species of aquatic animal that are prohibited to catch?
- Are people allowed to sell the fish they catch?
- Other questions

### **Wildlife**

- Are there any forest areas/zones set aside for the protection of wildlife in the village, as in a TPZ ??
- Is there any controls or regulations on hunting wildlife, and what are these ??
- Are there any regulations re. the timing of hunting, and re. the type of hunting equipment ?
- What are the names/species of wildlife animal that are prohibited to catch?
- Are people allowed to sell any wildlife that they catch?
- What is the fine etc for breaking the regulations, in each case ?
- Other questions

### **Question 9.** Livestock Management

What is the method and regulations for livestock management?

- 2: Are there any areas or zones 'permanently' allocated for livestock?
- 3: In case of liberating livestock for free roaming in village, what is the method to warn or fine the owner of the livestock
- 5: Are there vaccination practices for protection of disease?
- 6: In case of livestock destroy somebody else's crops, how is this resolved?
- 7: In case of disease occurred, what is about the monitoring and reporting system implemented?
- 8: It is approved to bring outside animals in to the village, to raise them? Importation of outside livestock into village for raising, what is about the method for protection?
- 9: In case of animal deaths for disease, occurred, are there any rules about what to do? Are these rules followed?
- 10: In case of animal death occurred and the owner take meat for food and sell or not destroy the dead animal body (not bury/burn and not protect), what is about method to discipline the violator?
- 11: In case of there was notification for vaccination of livestock, but the owner did not bring animals for medicine injection or does not follow and cooperated, what is about method to discipline the violator?

### **Question 10.** Management of Pesticide and Herbicides

- Is there any method and/or regulations for the control of use of Pesticide and Herbicides?
  - Are these regulations written down, and explained to villages?
  - Are these regulations followed?
  - Are there any Pesticides or Herbicides that are banned in the village?
  - In case of someone using banned chemicals, what is the disciplinary action taken?
  - Are there any regulations or system for the disposal of (i) pesticide and herbicide containers, and (ii) unused pesticide and herbicide??
- Is there any reporting system to follow up on and preventing of disease and insect spread?

### **Form 21: Monitoring and evaluation of FLUMZ plan**

For improving the village livelihood through the development of forestry and agriculture practice linked to agro-biodiversity enhancement for food security and income generation. The M&E will be conducted by discussion or interview villagers in group or individual household.

Before starting work with villagers, should review the FLUMZ book and record all existed data in table (below) this will be used to compare with the data gained from villagers (new information) to help observe the answers / information or reliability of the data.



The people who can provide the information as stated in this form include: the Village Organizing Committee, the PFALUPAM Working Committee and other groups (including all ethnic groups, the poor, women, men, elders or the elite / senior) and the general population within the Village.

Record the answer or the information collected using the instrument (√) as the answer: clear, yes / yes or decrease, and use the instrument (⊗) as the answer: not clear, no / no or not reduced and record the answer (detail) of the people to explain the cause or reason in the box: Explain.

*Note: The users of the table below need to understand the purpose of each data collection and be able to create their own questions. Example 2 of Question 1 asks about the clarity of the village management area. The registrar must compare the answers and the information in the plan as a basis for recording on the table whether the people know the area allocated as an agricultural area or not. In the case of interviewing many people with a number of people who understand and a number who do not understand the area designated as a farming area should write a description in the description room*

**Monitor:** ..... **Date:**.....

**Province District, Cluster village, Village:** .....

**Total number of population in Village (present):** ....(female) .... (ethnic).....

**Period of implementing PFALUPAM (month/year):** round 1: ..... round 2: ..... round 3: .....

I. Clearly defined the Village land border lines	Clear	Unclear	Explain
1. inter-village boundary lines			
2. Production land border lines			
3. Forest land bordering			
II. Organization, right and capability	Yes	No	Explain
4. Has the village PFALUPAM committee			
5. Does female and ekder are member of village PFALUPAM committee			
6. village PFALUPAM committee understood their role			
7. village PFALUPAM committee implemented their role			
8. Knowledge and capability of villagers to manage the forest and agricultural land increased			
9. Villagers can implement well the FLUMZ plan			
III. Protection and development of forest and upland agriculture land	Yes	No	Explain
10. Village ariculture land decreased (compared to CLUFC)			
11. Village ariculture land sufficient to villager's demand			
12. Villagers practiced upland cultivation inside the FLUMZ			
13. Villagers practiced upland cultivation correctly to FLUMZ			
14. Villagers practiced upland cultivation in group			
15. Villagers grow other crops instead of rice in upland			
16. Villagers also grow trees (specie, type of land)			
IV. Eco-agriculture situation	Yes	No	Explain
17. Forest area increased			
18. Water quantity in rivers increased			
19. Wild life number increased			
20. Number of aquatic animal increased			
21. NTFP (in forest) increased			
22. NTFP (in fallow) increased			
23. Average yield of upland rice (rotation) increased			

24. Average yield of paddy rice increased			
25. Socio-economic grow well			
V. Participatory	Yes	No	Explain
26. Village PFALUPAM committee consisted female and ethnic involed			
27. All key villagers involved in PFALUPAM process			
28. Villagerssss provided comments and ask question to clarify PFALUPAM process			
29. The implementation of PFALUPAM was divided in group work for discussion and information contribuion			
30. All issues and questions from villagrs were solved			
VI. Issue and constraint	Decreased	Not Decreased	Explain
31. Forest fire decreased			
32. Crop disease decreased			
33. Conflict on village boundary decreased			
34. Constraint on land use decreased			
35. Conflict on land tenure decreased			
36. Conflict on NTFP decreased			
37. Conflict on livestock management decreased			
38. Othe constraint			

Signature of Monitor

Remark: this form can be used for collection of information on village and household socio-economic and can be used in the works of round 1 and 2 during. This also will be used as evidence for comparing on impact or changed from PFALUPAM

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## **Annex II: How to use some Forms for data collection**

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### **1.1 Form 1: General Village Data Collection (primary)**

The objective is to collect general data on village history, population, employment, infrastructure, livestock, production, tools, previous land use activities and status (land and forest allocation), projects and various activities in the village of the past and present and etc... This information is collected directly, via interview, from the village administration.

### **1.2 Form 2: Data on Agricultural Biodiversity**

This information is also collected by interview of the village administration. The objective is to develop a general overview or Profile of the Agricultural Systems and Biodiversity, including name of rice varieties and crops in different agro-ecosystems of the village and the length of rotation of upland rice cultivation, but also on livestock, on forestry types and ecosystems, etc

### **1.3 Form 3: Production Profiles and Crop Calendar**

This information is also collected directly, via interview of the village administration and village economic unit. The objective is to collect data on seasonal cropping of different variety of the main or key crops in the area. Information recorded includes the production steps, production costs, products and income gained from the production of the main crops.

### **1.4 Form 4.1: Data on Collection, Sale and status of NTFPs**

The objective of this PRA focus group tool is to collect data on the richness and significance of NTFPs in different aspects of villagers livelihoods, eg, income, , food, traditional medicine and utilization, and also village level sales and income, and the current abundance status of each NTFP.

### **1.5 Form 4.2: Data Collection on the Prioritized NTFPs**

The objective of this of this PRA focus group tool is to collect information on:

- NTFP species that are becoming rare or extinct;
- NTFP species that the villagers propose to enrich in the forest; and
- NTFP species that the villagers propose to grow in gardens or plantations

### **1.6 Form 5.1: Data Collection on Wood Harvesting and Usage**

The objective of this PRA focus group tool is to collect data on the richness and significance of timber for the villagers. Also queried, is the level of sale and income, and the current abundance status of each timber species

### **1.7 Form 5.2: Data Collection on the Prioritized Wood**

The objective of this PRA focus group tool is to collect information on the situation of degrading forest and timber resources, and villagers' proposals, or ideas, on how to preserve, develop or rehabilitate those deteriorated forest to become as its originated nature.

This, specific information is gathered on:

- Wood species that are becoming rare or extinct;
- Wood species that the villagers propose to enrich in the forest; and

Wood species that the villagers propose to grow in gardens or plantations

### **1.8 Form 6 and 7: Data Collection on Aquatic and Wildlife**

The objective of this PRA focus group tool is to get information on the aquatic and wildlife species in the village, and their importance to the villages. Also queried is the status/abundance of each biodiversity (aquatic, terrestrial) species, and the reason for any change.

### **1.9 Form 8: Problems Census and Solutions**

The objective of this PRA focus group tool is to collect data on problems, the cause of problems, the impacts of the problems, and ideas on how to solve problems.

### **1.10 Form 9: Data Collection on Potential for Village Development**

The objective of this PRA focus group tool is to collect data on the conditions and potentials for village development in relevant sectors such as agriculture, forestry, health and others.

### **1.11 Form 10: Data Collection on Population, Needs of Rice and Family Livestock.**

The objective of this Household interview survey (100 % of Households in the village) is to collect data on the population, labor units and occupation, rice self sufficiency, livestock holdings.

### **1.12 Form 11: Data Collection on Family Income**

The objective of this Household interview survey is to collect data on the family's source of income and approximate income from each source.

### **1.13 Form 12: Data Collection on Land Management, Occupancy and Use of Family**

The objective of this Household interview survey is to collect data on land use and occupancy - and production - by each household within the village, which key content of this form being plot location, area, background of the land, type of land ownership documents, type of cultivated crops, production yield of each land parcel and future intended land use.

### **1.14 Form 15: Record of Soil Sampling**

This form is used to record data on soil physical properties, as assessed at the time of soil sampling, which consists of the following 3 main points:

- Location and soil environment
- General Characteristic: depth, soil texture, soil color
- Characteristic of different soil strata

### **1.15 Form 17.1 and 17.2: Record of Field Survey, including GPS**

To record the GPS field survey data collected, and other information observed during the field survey. The forms are very similar, except one is for geographical and Pol survey, one is for village boundary survey and one is for survey of land use and forest covers

## Annex III: Draft proposal and approval documents for FLUMZ

No	Name of the draft file	Remark
I. Draft the document used in Step 2, Step 3		
1.	Draft of the Village Application Form for the appointment of a committee responsible for participatory planning, allocation and management of agricultural and forestry land at the Village level	
2.	Draft application form of the District Agriculture Office on the application for the appointment of a committee responsible for the planning, allocation and management of participatory agricultural and forestry land at the Village level	
3.	. Draft Agreement of the District Governor on the appointment of a committee responsible for the planning, allocation and management of agricultural and forestry land in a participatory manner at the Village level	
4.	Draft Village Management Memorandum (between Village to Village) Village to Village	
II. Draft the document using Step 5 Step 2		
5.	Draft report on monitoring and implementation of implementation of agricultural and forestry land use zoning plans at the village level	
6.	Draft report on land use monitoring in accordance with the village-level agricultural and forest land use management zoning plan	
7.	Draft application form of the Office of Agriculture to approve the plan for the allocation of agricultural and forestry land use management zones at the Village leve	
8.	Draft application form of the Office of Agriculture to approve the plan for the allocation of agricultural and forestry land use management zones at the Village level	
9.	Draft Decision of the District Governor on the Approval of the Allocation Plan for Agricultural and Forestry Land Use Management Zones at the Village Level	

**Proforma of Proposal for an appointment of responsible committee for village agricultural land use and forest allocation (proposed by village)**



Lao People's Democratic Republic  
Peace Independence Democracy Unity Prosperity

District.....

Village.....

No/.....

Date .....

**Proposal**

To: The Director of District Agricultural and Forestry Office.

Ref: Requested the District Decision on the Appointment of Responsible Committee

for..... Village Agriculture Land Use and Forest Allocation,

In ..... District, of .....Province

- Refer to the Lao PDR Law on local administration, No. 03/NA, dated 21/10/2013, chapter III, article 27 on rights and duties of the District Governor.
- Refer to the Discussion and Consent made with village and village cluster on.....

The head of ..... Village is honored to propose to the Director of District Agriculture and Forestry Office to issue a Decision on the appointment of responsible committee for village agricultural land use and forest allocation for..... Village, as name listed below:

- |  |                             |
|--|-----------------------------|
| 1) Mr/Ms..... ( ? responsibility in the village) | as a committee head,        |
| 2) Mr/Ms..... (? responsibility in the village)  | as a deputy committee head, |
| 3) Mr/Ms..... (? responsibility in the village)  | as a committee member,      |
| 4) Mr/Ms..... (? responsibility in the village)  | as a committee member,      |
| 5) Mr/Ms..... (? responsibility in the village)  | as a committee member,      |
| 6) Mr/Ms..... (? responsibility in the village)  | as a committee member.      |
| 7) Mr/Ms ..... (? responsibility in the village) | as a committee member.      |

This committee shall perform their activities based on the scope of their mandates, right and duties and report to the village authorities periodically on a regular basis.

Therefore, this proposal is made to you for consideration and approval.

Yours sincerely.

**Head of .....Village**

**Proforma of Proposal for an appointment of responsible committee for village agricultural land use and forest allocation (proposed by DAFO)**



Lao People's Democratic Republic  
Pleace Independence Democracy Unity Prosperity

.....Province

Agriculture and Forestry Office

No../ໜັງສື

Date .....

**Proposal**

To: .....District Governor.

Ref: Requested an appointment of responsible committee for .....village agricultural land use and forest allocation of .....district, ..... Province

- Refer to the Minister's Decision on the organizations and mandate of the District Agricultural Land Management and Development Unit, No. 1931/AF, 20 September 2013.
- Refer to the proposal submitted by..... village authorities,  
of .....District, ..... Province, dated.....

The Director of Agricultural and Forestry Office is honored to propose to the District Governor to issue the Decision on the appointment of responsible committee for ..... village agricultural land use and forest allocation,.....district, ..... province, as name listed below:

- 1: Mr/**Ms**..... ( ? responsibility in the village) as a committee head,
- 2: Mr/**Ms**..... ( ? responsibility in the village) as a deputy committee head,
- 3: Mr/**Ms**..... ( ? responsibility in the village) as a committee member,
- 4: Mr/**Ms**..... ( ? responsibility in the village) as a committee member,
- 5: Mr/**Ms**..... ( ? responsibility in the village) as a committee member,
- 6: Mr/**Ms**..... ( ? responsibility in the village) as a committee member.
- 7: Mr/**Ms** ..... ( ? responsibility in the village) as a committee member.

Therefore, this proposal is made to you for consideration and approval.

High regards.

**District Agricultural and Forestry Office**

**Proforma of Decision on the Appointment of Responsible Committee for Village Agricultural Land Use and Forest Allocation (The District Governor's Decision)**



Lao People's Democratic Republic  
Peace Independence Democracy Unity Prosperity

Province.....

District:.....

No...../DG

Date.....

**Decision on**

**The Appointment of Responsible Committee for .....Village land use and forest allocation,.....district, ..... province**

- 1** Refer to the Lao PDR law on local administration, No 03/NA, dated 21/10/2013, chapter III, article 27, on the rights and duties of the District Governor.
- 2** Refer to the proposal made by the Director of the District Agricultural and Forestry Office, No...../DAFO, dated.....

**The District Governor has issued the Decision as follow:**

**Article 1:** Agreement on the appointment of Committee for .....Village agricultural land use and forest allocation, .....district,..... province as name listed below:

- 1: Mr/**Ms**..... ( ? responsibility in the village) as a committee head,
- 2: Mr/**Ms**..... ( ? responsibility in the village) as a deputy committee head,
- 3: Mr/**Ms**..... ( ? responsibility in the village) as a committee member,
- 4: Mr/**Ms**..... ( ? responsibility in the village) as a committee member,
- 5: Mr/**Ms**..... ( ? responsibility in the village) as a committee member,
- 6: Mr/**Ms**..... ( ? responsibility in the village) as a committee member.
- 7: Mr/**Ms** ..... ( ? responsibility in the village) as a committee member.

**Article 2:** This responsible committee has the roles and duties as specified in the attachment, and will report to the village authorities on a regular basis, and perform their tasks as assignment accordingly.

**Article 3:** All relevant parties must be aware and provide facilities to the responsible committee accordingly.

**Article 4:** This Decision comes into forces since the date it is signed.

**The .....District Governor**



## Proforma of Memorandum on Village Boundary



Lao People's Democratic Republic  
Peace Independence Democracy Unity Prosperity

Province:.....

District:....., Cluster:.....

Village:.....

No..... /

Date .....

### **Memorandum on Boundary between.....Village and .....Village**

- 3** Refer to the Decision of the Minister of the Prime Minister Office, No 67/PM, dated 18 June 2004 on the organization and mandate of the National Land Management Authority.
- 4** Refer to the discussion meeting on determination of..... Village boundary together with surrounding villages representatives, which is organized in the..... village meeting hall on (date).....

To comply with the party and government policy on land and forest management of the individual villages to be clear and consent within village and village cluster, easy for management and protection, and being used in accordance with tradition and being compliant with regulation and the law of the country.

Therefore, the relevant 2 Village organizations have agreed to determine the description of the boundary between the 2 Villages as detailed belows:


With a total length.....m, and with GPS coordinate point as shown in table 01 below:

Table 1: Lat/Long coordinates of key points on the boundary between the 2 villages.

Nr.	deviation (m)	elevation)	latitude: (X)	longitude (Y)	name/description

Sketch Map, or GIS Maps , of the boundary between the 2 villages

Thus, the 2 Village Organizations have made this memorandum to be used as a reference document for future management of village boundary between each another.

**Table 02: Participants of the Village Boundary Discussion Meeting**

No	Village/cluster	Name/Ssurname	Responsibility	Tel	Signature
1					
2					
3					
4					
5					
9					
10					

Head of Village: ?		Head of Village: ??	
Signature and stamp:		Signature and stamp:	
Name:	date	Name:	date

**Certified & Acknowledged by:**

District Natural Resources And Environment Office	District Agriculture and Forestry Office	District Home Affairs Office
Signature and stamp:	Signature and stamp:	Signature and stamp:
Name:	Name:	Name:

**Certified by the District Governor:.....**

**Date:.....**

## District Governor's Decision on Adoption of Land Use and Forest Allocation Plan



Lao People's Democratic Republic  
Peace Independence Democracy Unity Prosperity

Province:.....

District:.....

No...../DG

Date .....

### **Decision on** **The Adoption of .....Village land use and forest allocation plan,** **.....District, .....Province**

- Refer to the Land Law, article 11 on Land type and land allocation survey.
- Refer to the outcome of the participatory agricultural land use planning and forest allocation and the proposal made by the District Agricultural and Forestry Office and the District Natural Resources and Environment Office, on the consideration and approval of .....village agricultural land use and forest allocation plan, ..... village cluster, .....district, .....province, No...../DAFO, dated.....

### **The District Governor has issued the following Decision**

- Article 01:** Agrees to adopt the .....Village agricultural land use and forest allocation plan, No....., dated.....
- Article 02:** The District Agricultural and Forestry Office, District Natural Resources and Environment Office and other parties should be aware and provide supervision for the compliance with the said plan and turn this plan into management regulations to ensure land use responsibility in the future.
- Article 03:** The..... Village authorities and villagers should be aware and together implement, manage, protect and use this plan accordingly with the goals and ensure for environmental protection and agro-biodiversity.
- Article 04:** This Decision is effective and applicable from the date it is signed.

**Certified by the District Governor:.....**

**Date:.....**

## Approval of private fixed agricultural land (farm/sanam) in communal land/forest



Lao People's Democratic Republic  
Peace Independence Democracy Unity Prosperity

District \_\_\_\_\_

Cluster village \_\_\_\_\_

village \_\_\_\_\_

Number \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

date \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

### **Note of Acknowledgment of Private Agriculture Land located in Communal Land Zone**

Permanent cultivation area or the area where villager construct the hut for permanent cultivation

- Reference on: Common agreement of village FLUMZ committee of Ban \_\_\_\_ dated \_\_\_\_
- Reference on: Data collected and map developed on \_\_\_\_\_date \_\_\_\_/\_\_\_\_/\_\_\_\_\_

The village administrative committee agreed to the family of Mr/Ms.....HH census no.....Unit.....Village.....District.....Province.....

Since .....years ago, he/she use to construct the hut for conducting of permanent agriculture and livestock and/or he decided to manage the land as permanent cultivation land, i.e., a FARM

Location site			In which communal land zone
GP/lat-long co-ords	X:	Y:	
Area (estimate)		hectare	
Objective/activity			

Allowed him/her to use the land for fixed occupation land to conduct the crop plantation or/and raising animal, but should be under these following condition:

- Not encroach out of the area allocated in FLUMZ.
- Not clear or use any other fallow areas that are already zoned in FLUMZ as the upland rotation agriculture land of village community.
- Not allowed to sell the land to other person

Therefore, this note was made for using as evidence, is effective since the date of signed.

Mr/Ms:	date	Mr/Ms:	date
Occupier of the land (sanam)		Head of Village FALUPAM Committee	
signature:		signature:	
Mr/Ms:	date	Mr/Ms:	date
Village Chief		Head of DONRE	
signature:		signature:	

## FLUMZ Monitoring Report Proforma



Lao People's Democratic Republic  
Peace Independence Democracy Unity Prosperity

Village.....

District:.....

date.....

### Report

#### Monitoring of Forest and Land Use in comparison to the FLUMZ Plan in

Village: .....Goomban:.....District:.....Province.....

- in reference to the participatory forest and land use planning (pFALUPAM) that was completed on date: ...../...../..... of village .....
- in reference to the monitoring and checking of the actual land use in comparison to the FLUMZ Plan, in order to promote villagers use of the FLUMZ towards effective and productive usefulness for the villagers and the agro-ecosystems
- in reference to giving the opportunity to villagers to provide their ideas and proposals to revise and improve the FLUMZ so that it is appropriate, realistic and possible to implement.

#### 1.1: list of FALUPAM team members

nr	names	responsibility	agency	phone nr.

#### 1.2: list of members of the village FALUPAM Committee who participate in the process

nr	names	responsibility	agency	phone nr.

## **2: Results of monitoring the Upland Fields**

#### 2.1: upland cropping land as per the FLUMZ plan

code	sub - zone	year	area	name of zone

2.2: the real area/land cropped in year-season XX\_XX (based on the monitoring)

location of the upland fields	Nr. HHs	comment	
<b>In the planned zone</b>			
<b>Out of planned zone</b>		<b>reason – if out of plan</b>	<b>proposed way to resolve</b>
1:			
2:			
3:			

### **3: Results of Monitoring other land zone types**

(those zones that have changed from the FLUMZ plan)

code	name of zone	problem	proposed way to resolve
	1 :		
	2:		
	3:		

### **4: Summary of revision or improvement of the FLUMZ plan**

After the staff, the VFLC, and the villagers have reviewed and understand the results of the monitoring, and have agreed on the ways to resolve the issues and improve the FLUMZ plan/map to be appropriate to the realities in the village, the the possibility for the villages to follow the FLUMZ, it is agreed to revise and improve the FLUMZ plan as follows:

<b>New Upland cropping zones - based on an annual rotation of XXX years</b>				
code	sub-zone	year	area, ha	name of revised sub-zne

New Forest Zones - only those revised or modified			
area, ha	name of revised sub-zne	area, ha	name of revised sub-zne
Other Zones			
area, ha	name of revised sub-zne	area, ha	name of revised sub-zne

#### **5: Other Proposals from the village**


#### **6: agreed and accpetd by:**

<b>Mr/Ms:</b>	<b>date</b>	<b>Mr/Ms:</b>	<b>date</b>	<b>Mr/Ms:</b>	<b>date</b>
position		position		position	
signature:		signature:		signature:	
<b>Me/Ms:</b>	<b>date</b>	<b>Mr/Ms:</b>	<b>date</b>	<b>Mr/Ms:</b>	<b>date</b>
position		position		position	
signature:		signature:		signature:	



**5 Proforma of Proposal to DAFO for approving the village FLUMZ plan (proposed by village)**



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

**District.....**

**Village.....**

**No/.....**

**Date .....**

**Proposal**

To: The Director of District Agricultural and Forestry Office.

Ref: Requested the District Decision and approval on the village FLUMZ plan of  
Village.....District..... Province.....

- Re. The Land Law, article 11 on the survey, zoning and classification of land type
- Re. the accomplishment of village FLUMZ plan developed during the date.....at  
Village.....District.....Province .....

The head of ..... Village is honored to propose to the Director of District Agriculture and Forestry Office to issue a Decision on FLUMZ plan of Village.....District.....Province..... which consisted of: 1) Book of village FLUMZ plan and 2) village topomap, village boundary map, CLUFC map and FLUMZ map.

Therefore, this proposal is made to you for consideration and approval.

Yours sincerely.

**Head of .....Village**

**6 Proforma of Proposal to District Governor for approving the village FLUMZ plan (proposed by DAFO)**



Lao People's Democratic Republic  
Peace Independence Democracy Unity Prosperity

.....Province

Agriculture and Forestry Office

No../ໜັງສື

Date .....

**Proposal**

To: .....District Governor.

Ref: Requested the District Decision and approval on the village FLUMZ pland of Village.....District..... Province.....

- Re. The Land Law, article 11 on the survey, zonning and classification of land type
- Re. the accomplishment of village FLUMZ plan developed during the date.....at Village.....District.....Province .....

The Director of Agricultural and Forestry Office is honored to propose to the District Governor to issue the Decision on the FLUMZ plan of Village.....District.....Province..... which consisted of: 1) Book of village FLUMZ plan and 2) village topomap, village boundary map, CLUFC map and FLUMZ map.

Therefore, this proposal is made to you for consideration and approval.

High regards.

**District Agricultural and Forestry Office**

## 7 District Governor's Decision on Adoption of the FLUMZ Plan



Lao People's Democratic Republic  
Peace Independence Democracy Unity Prosperity

Province:.....

District:.....

No...../DG

Date .....

**Decision on**  
**The Adoption of .....Village land use and forest allocation plan,**  
**.....District, .....Province**

- Refer to the Land Law, article 11 on Land type and land allocation survey.
- Refer to the outcome of the participatory agricultural land use planning and forest allocation and the proposal made by the District Agricultural and Forestry Office and the District Natural Resources and Environment Office, on the consideration and approval of .....village agricultural land use and forest allocation plan, ..... village cluster, .....district, .....province, No...../DAFO, dated.....

**The District Governor has issued the following Decision**

- Article 01:** Agrees to adopt the .....Village agricultural land use and forest allocation plan, No....., dated.....
- Article 02:** The District Agricultural and Forestry Office, District Natural Resources and Environment Office and other parties should be aware and provide supervision for the compliance with the said plan and turn this plan into management regulations to ensure land use responsibility in the future.
- Article 03:** The..... Village authorities and villagers should be aware and together implement, manage, protect and use this plan accordingly with the goals and ensure for environmental protection and agro-biodiversity.
- Article 04:** This Decision is effective and applicable from the date it is signed.

**Certified by the District Governor:.....**

**Date:.....**

## **Annex IV: Survey and assessment of soil fertility**

### **1 Introduction**

Soil sampling is the collection of soil from a specific area to determine if there are enough nutrients for crops. Improper soil sampling can lead to erroneous assessments of the soil fertility, so it is important to collect the correct soil sample to get a truly representative soil in the area. Collected soil samples must contain the amount and type of plant nutrients as well as other properties. Therefore, care must be taken in collecting soil samples in accordance with technical principles in order to obtain soil samples that are well represented and have sufficient quantities to be used for soil analysis.

In addition to the survey and collect sample soil in the field is to have a number of important for evaluate the fit of the soil to grow plants. Which is a data base on the science that be used in the planning map on the use of agriculture land and forest wood that not is the management and development of the agriculture in the room of potential strength of physical conditions and terms and conditions of the soil in each region the brand on the use and cost of land stand long.

#### **1.1 Equipment and tools:**

- Topo-maps or geographical maps
- Map Geology
- Map of current agricultural and forestry land use
- Map of the article part 1: 250,000 (Center for Research and the plan the use of the farm)
- Plan on a hill slope
- Pen, drawing pencil (size 0.5-0.7 mm)
- glass, dark universe, scissors, knives, wooden meter, steel drill ground, bags cloth bags or plastic to sample soil and to the sample surface
- books, records, a form to record the hole, furnished a written bag land, father, or pencil writing, the Deputy of Kiev and books than paint
- Air catch point coordinates (GPS)
- Monitors the field Soil Test Kit

#### **1.2 The action:**

The team work who will perform the activities required knowledge and understanding about the soil survey and soil samples before through training or the practice already, as well as the need to use and understand on mapping to determine the soil and space exploration field actually, the number of people responsible for this task approximately 1 - 2 per team.

For people to join the work must be directed to the areas of the village such as the name and location of the water, the river, the mountains and hills, mountains on the condition the use of land and other points. Can lead the team to the soil survey area and assist the team to collect soil samples and have an important role in assessing the level of fertility with the team in the field as well. Which many villagers to work for approximately 2 - 3 per team.

### **2 Identification of soil sampling points:**

Identifying land sampling sites is another important task that needs to be completed prior to the actual field survey.

For determining the soil must be based on many factors such as the landscape of the area (Topography), Map Geology, condition or history of land use, crops grown, the growth plant growth, fertilizers or chemical fertilizers in the past, the level of the slope of the ground (Slope) and based on map information in the ratio of 1: 250,000 (Center for Survey and planned use of agricultural

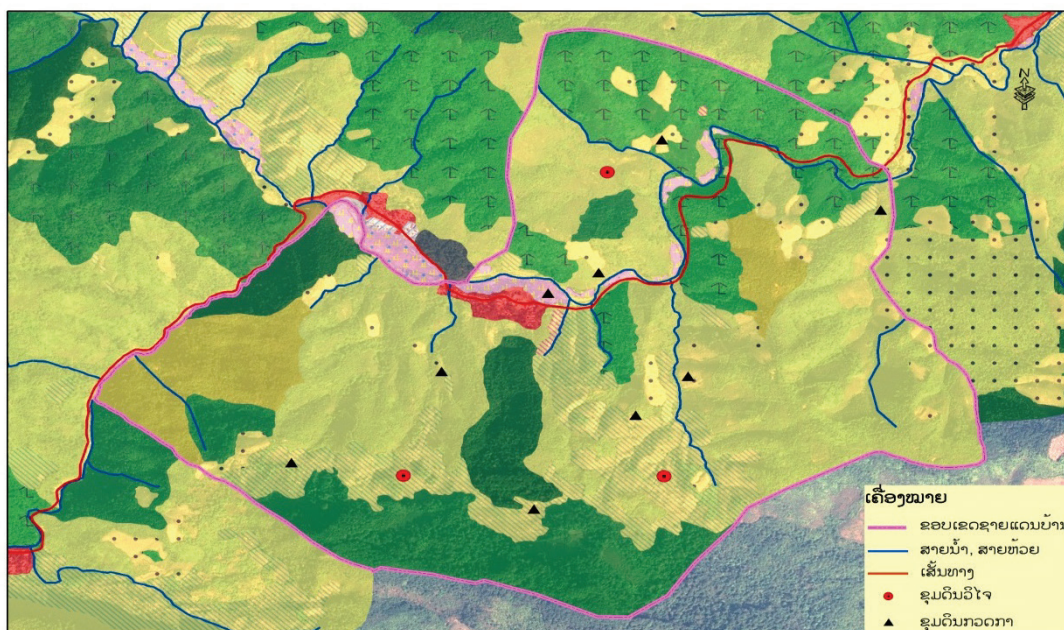
land) as a reference to determine the soil by dividing boundary of land to each segment, such as land, forest land for construction or land that is not used in production agriculture (not defined soil ) and dividing agricultural land or areas that are used in manufacturing farm each night (the sequence number) according to the conditions mentioned above, and then determine the soil in each segment to land that can be represented in areas such land, which tools this way limit or soil 2 ways:

### 3 Detailed soil survey and collection

**Survey and detailed soil sampling have 2 features:** the hole the way research (Profile) and hole the check (Auger). Hole Land of Research 1 hole to set hole ground check about 4-5 holee for inspection around the the hole the way research ship to study nature, landscape materials native land, the appearance of the land, structures, paint and Land, for example, to be used as basic information for land classification and compilation of land maps in accordance with the system of FAO UNESCO 1990 / WRB (requires a lot of time and budget)

**Table 1 : The set contains the dig , drill in for the wire and collect soil samples**

ล/ด	Article Map section	Resolution of payment Police	Area (ha) / 1 Cm <sup>2</sup> on the map	Frequency of Digging, drilling Soil survey (ha / point )	The other side of the survey
1	1/5000 Or larger	Very detailed style (very detailed)	0.25 ha	1 - 2 ha	To test agricultural and planning land use right in the center, station test tries.
2	1 / 10,000	Detailed style Moderate (Moderately Detailed)	1 ha	3 - 5 ha	Planning to use the land for the development of agriculture - forestry small, minute or garden in.
3	1 / 25,000	Detailed style (Detailed)	6.25 ha	10-15 ha	To plan land use, and evaluate, plan for projects of irrigation and the drainage water for the production agriculture - forestry as priority areas.
4	1 / 50,000	Quite a style Detailed Semi-detailed	25 ha	20-25 ha	Plans to develop the local, evaluation of planning irrigation and drainage water large.
5	1 / 100,000	Coarse Initially (reconnais Scanne)	100 ha	100-200 ha	For regional or provincial development planning, evaluate values for large- scale projects.
6	1 / 250,000 Or less	Wide style or Overall (Exploratory Or general)	625 ha	1000-2000ha	For regional or national development planning.



ຮູບ

Figure 1 : Sampling point of the excavation hole and inspection hole

#### 4 Participatory soil fertility survey and assessment:

Refers to the identification or collection of soil samples distributed throughout the area. The more frequent the soil sampling, the better the soil sample will be (for more details, see how to use the Soil Test Kit).

##### 4.1 Appropriate time for soil sampling :

Collecting soil samples can be collected throughout the year, but when the right is after harvest yields approximately 2 months before planting because when soil moisture suitable and convenient to collect soil samples which can test the soil moisture suitable for soil or by pinch ground firmly and then hand if the soil is still tacky display that is ideal for collecting soil samples.

##### 4.2 Soil sampling method:

Soil surveys and sampling depend on the purpose and objectives of the survey in each area. After completing the required soil with the people to make it to the performance of the online action plan set and make for success as expected. First the team technical and villagers to the division of responsibility, such as : who is responsible for collecting soil samples, tools, equipment use and leadership in the space exploration field early on to explore the actual point of the set if that point is not consistent or can not be represented in areas such team to explore can edit the soil appropriate then to collect soil samples and record data to the stage And detailed implementation methods of the following 2 methods:

#### 5 Detailed soil survey and sampling:

After the team can find soil set in or the soil can be represented in areas such land is digging the soil to turn off the landing pit on the sun every time ( for the flat and the areas that has slope steep little less or upon the right combination to the hole land ) the peasant help to be able to watch grade of the hole on the ground are clear , easy to discriminate speech stratified soil each layer can record the phenomenon in which holes the soil thoroughly and correct principle of digging the soil 2 looks like another: hole Land Research (Profile) the size of the hole than the approximately 80cm long, 150 cm deep 120 15 0 cm . Each excavated pit must record the shape of the mulch , demarcate the soil , observe and record the phenomena found in the soil, and collect soil samples for analysis of each soil layer found in the soil pit between 2 - 5 samples per hole ( depending on the area and nature



of the pits ). In case the stone floor strength or level of groundwater in shallow even dug up but the floor and record details on Form landing pit and pit soil States (Auger) using the tool owner and the soil depth of about 80 - 100 cm on average about 4 - 5 holes the inspection 1 hole the researchTo find the edge region of the distribution of land but of the kind that broke the back of the hole of the soil has a low muff of the current record images of thousands of land and the law and the other is found in the soil as well as the hole the way research and take soil samples at least 12 for example, in the deep from 0-50 cm to the research and assists soil horizons and the rich soil of the .After complete dig soil research or landing pit inspection, stratified soil layers, numbered holes the date and month of storage (landing pit Research: NVKP 01; 07/10 / 2014 and the landing pit inspection NVKA01; 07/10 / 2014) and took a photo section landing pit , the use of the land of the landing pit and the other is to watch night , a reference to distinguish land and fill out reports .

**Figure 2 : Laying of the excavation hole (Profile)**



**Figure 3 : Soil classification and morphology of the landslide**



**Figure 4 :: to dig or drill a hole the inspection and classification of the land inspection hole (Auger)**



**Figure 5 : bags of soil samples and soil and record details of the landing pit**

For exploration and sampling the soil in this form to study and record details of each layer in the field as is, factors involved in the origin and changes the character external phenomena are found by cutting the landing pit as : the thickness or depth of top soil from the floor (the depth of the soil layer suitable than 30-40 cm) , the colors of the land , the structure of the soil , ground beef , the pulp density of the soil , root wood , stone casting mix and the various components of each layer of soil . Which to collect samples land on the floor surface of the hole the way research is to keep the soil below on the Penal comes to ranking the following layers on (floor) on the share classs ground to protect against the dilution mixing of land in each of the layers in the soil volume collected by an average of 0.5 - 1 kg per 1 bag of soil samples and soil layer on the surface ( mono less ) to study a brand, a land of filling in the office and soil samples at each floor or each hole the inspection and on the need to write code landing pit, water Off landing pit , depth, days to months in storage, the use of the land now and be well .

## **6 Participatory soil fertility survey and assessment :**

In order to save budget and time for the implementation of the soil fertility assessment, in addition to taking soil samples to the laboratory to find the physical and chemical properties of the soil as a scientific certification, then this information will be used to assess the fertility of the soil. Which can assess the fertility of the soil to finish in the field, but the knowledge and experience of technical soil survey is to assess which will be responsible for this task must be trained or organized practice with those skills before, used to check the quality of the soil (Soil Test Kit) and the wisdom of the villagers or never use the actual crop in the past so as to verify and contribute decision assessment fertile soil that is appropriate at low, medium or high for crop species.

Which factors or properties physical and chemical properties of the soil used in the assessment include: the amount of nitrogen (N) amounts of phosphorous US useful ( $P_2O_5$ ) the amount of potassium ( $K_2O$ ) Value Click alkaline soil (pH) depth of soil (Soil Depth) , soil (Soil Texture) and level the slope of the ground (Slope) .

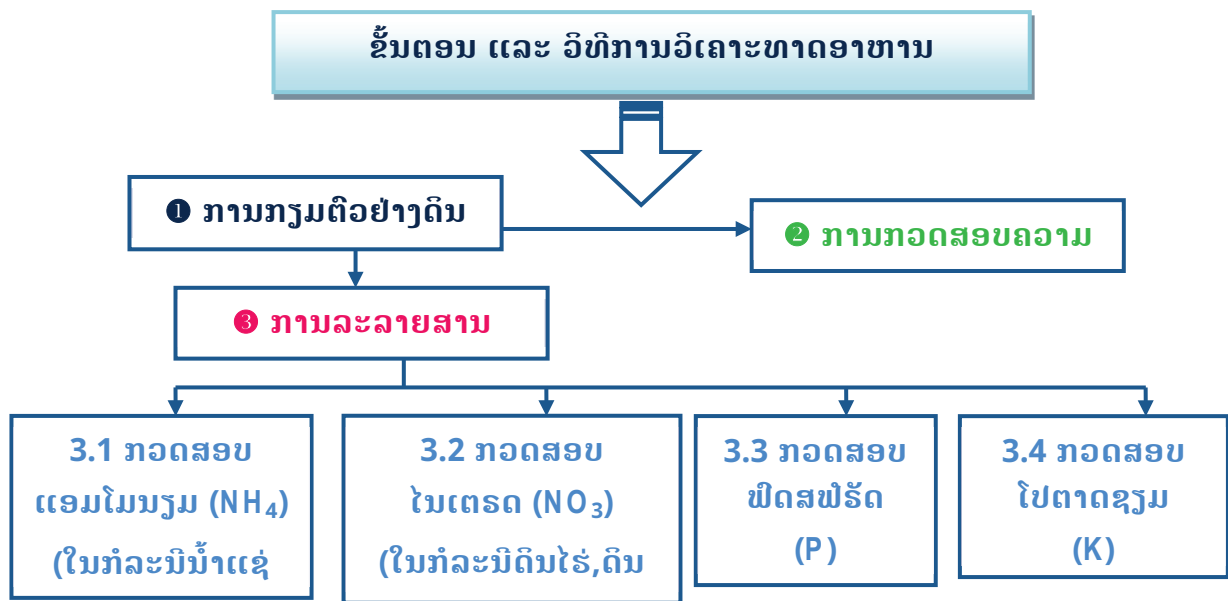
For the implementation of this task is after complete set points soil into place, team technical and villages to explore along the set or can be adapted to the land that represents the first travel survey sampling soil random gather around the area and then land storage was integrated into the Tool Soil Test Kit to research the amount of nitrogen (N) amounts of phosphorous state that is usefull ( $P_2O_5$ ) the amount of potassium ( $K_2O$ ) and pH alkaline soil (pH) .

For depth of soil (Soil Depth) is how to dig a tool to monitor soil (Soil Texture) method touch hand and level the slope of the ground (Slope) observed interpretation in the field of academic ground with steps and how the operation of the factors listed below:

## **7 Using the Soil Test Kit :**

Tool to check the quality of the field the amount of nitrogen (N) amounts of phosphorous US useful ( $P_2O_5$ ) approximate the potassium ( $K_2O$ ) and pH alkaline soil (pH) which Conservation and Development Agriculture Department and development of agricultural land (DALaM) has manual instructions on how to use the information and can be used easily with details as follows:





 Equipment for plant nutrient testing



**Figure 6 :** Accessories (where the water is the water for conditioning soil Soil Test Kit )



**ຮູບທີ 2.** ຕົວຢ່າງອຸປະກອນທີ່ຈໍາເປັນສໍາລັບການລົງເກັບຕົວຢ່າງດິນ

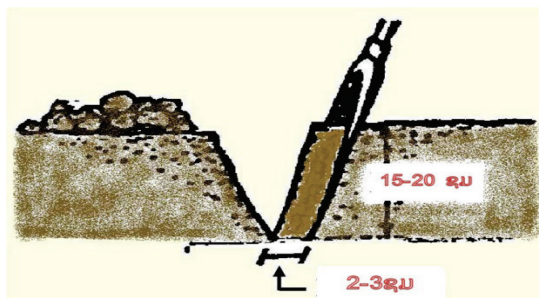
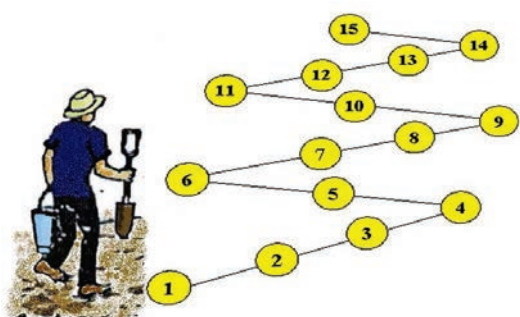
## 8 Sampling and soil tillage research

### 8.1 Soil sampling

The sampling of the soil in the field or garden that you want to research must be done in accordance with the technical principles. Obtain accurate land information with the following simple implementation methods:

**Soil sampling equipment .** These include cloth bags for soil samples, soil drill bits, hoists , shovels , buckets, pens and notebooks (Figure 2).

**How to implement** Observe the land use area well to classify the soil sampling points (lowlands, hills, sandy loam, loamy soils), storage area 2-3 samples per 1 soil sample (collect several points and mix together into 1 sample), one plot collect 15 points (as in the drawing below), using the walking method. Collect soil samples according to the designated area. After collecting 15 samples, put the collected soil in a bucket on a plastic sheet and mix thoroughly, divide the mixed soil into four parts, throw one part (do about 3 times), leaving about 1 kg of soil to fill. Plastic bags. The outside of the bag must be labeled with the bag number, soil, depth, collection date and location. Also to record details on a book about the characteristics, plant thousands of the nation around the side , kind of crop, and volume powder to put in each year.

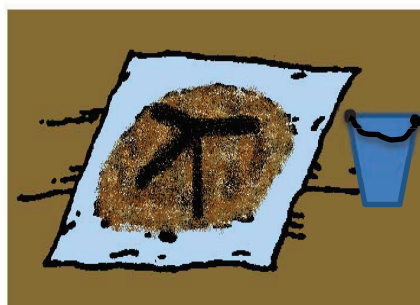


Pictures of 3: walk soil sampling stalled in 1 conversion

Pictures of 4. manner drill sampling soil cultivation



Photo to 5, 6. mixed soil samples were collected in a bucket



ປະສົມ ແລະ ແບ່ງດິນອອກ ເພື່ອເອົາຕົວຢ່າງດິນ

### 8.2 Preparation of land for the research

- the soil should dry land in the shaded air clear no contamination should be dried in the sun and rain on because the nutrient loss is particularly nitrogen N .
- Grind or dig the soil through the hole 0 , 5 mm. If not, you can put a green net instead, but it must be cleaned and then stacked so that the grains are not too large, the ground soil is put in a glass container to prepare for research.
- About 0.5 kg of soil is analyzed for nutrients by using the Soil Test Kit.



ຮູບທີ 7: Pictures of 7 : to prepare a sample soil (dry soil research)

### 8.2.1 Soil acidity ( pH ) and detection

Value pH of the soil pH - pH value between 1-14, but neutrality is pH of 7, if less than 7 indicate acid soil or soil is acidic , if the value pH of soil above 7 indicates that the soil is alkaline (alkaline soil). Acidic soil associated with a range of useful plant nutrients in the soil such as pH lower than 5. associated with containers Al and Fe very strong as a binder nutrients useful plants, especially iron Phi ( P. ) Plants can not use nutrients.

#### ➤ To check pH of soil

- the ground through a hole in the ground on the soft plastic spoon half hole with soil and then drops down until 10 poison the soil saturation, add 2 drops of bleach No. 10

**ການກວດສອບຄວາມເປັນກົດ-ດ່າງ (pH) ຂອງດິນ**

**ໃສ່ດິນເຄິ່ງຊຸມ**

**ຖາດຊຸມຢາງ**

**ນ້ຳຢາເບີ 10**

**ແຜ່ນທຽບສີມາດຕະຖານ (pH)**

1. ໃສ່ດິນລົງໃນຊຸມຢາງປະມານເຄິ່ງຊຸມໂດຍໃຊ້ບ່ວງຕັກດິນທີ່ສະອາດ
2. ຢອດນ້ຳຢາເບີ 10 ລົງໄປຈົນດິນ ອື່ມຕົວດ້ວຍນ້ຳຢາແລ້ວເພີ່ມນ້ຳຢາອີກ 2 ຢອດ
3. ເນັ້ງຖາດຢາງໄປມາ(ຖ້າດິນໜຽວດິນຈະເກາະກັນເປັນກ້ອນໃຫ້ໃຊ້ປາຍບ່ວງເຄ່ຍ ຕ່ອຍໆລະວັງຢ່າໃຫ້ນ້ຳຢາຊຸ່ນ)
4. ປະໄວ້ 1 ນາທີ ສົມທຽບສີຂອງນ້ຳຢາບໍລິເວນຂອບຊຸມກັບແຜ່ນທຽບສີມາດຕະຖານ

Figure 8: pH test

- The Trend hole soft plastic back to bleach constituent reactions to the ground if clay to catch gather ice to tip tablespoons simmer down, but be careful not to bleach solution because it can not read the displayed results come out clearly. Then leave it for about 1 minute and compare it with the color matching paper by observing the liquid around the edge of the hole with the standard color matching sheet.



Figure 9, 10 drops of bleach characteristics measured values pH and color on paper

### 8.2.2 Prepare aqueous solution to test plant nutrients ( N ), P ( P ) and K ( K )

- Gently tap the soil sample with a plastic spoon 3 times, then scrape the rest of the soil into a plastic jar and add 20 ml of No. **1 solution** , allow to cool for 5 minutes to allow the soil to react with the solution.
- from the introduction to the filter with filter paper prepared for the water blocked the exit from



Figure 11: Soil extraction process

- Fold the filter paper into a conical shape. Put the folded paper into the cone and pour the water. ັ Extract the reacted soil and put it in the support box. Wait until the soil is wet. It takes about 5 minutes to filter the extracted water to analyze N, P, K next .

#### • Prepare equipment for filtration of solvents

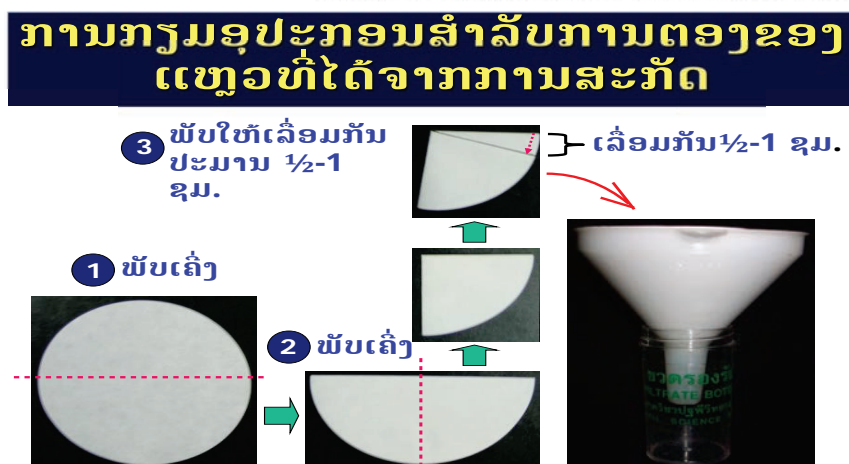






Figure 12: Equipment preparation and filtration ດິນ Soil extraction

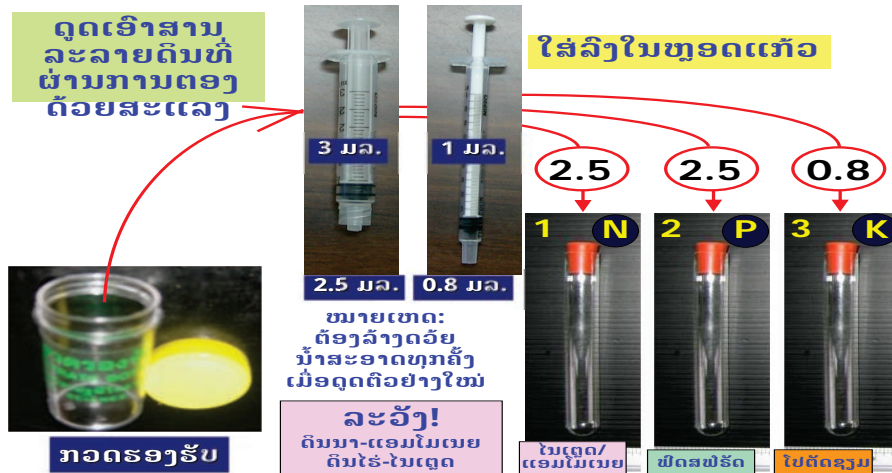


Figure 13 : Soil preparation for nutrient testing

### 8.2.3 Detection of N

Nitrogen (N) analysis has two forms: Ammonium ( $\text{NH}_4$ ) analysis for nutrients in soil, water and soil. The nitrate form ( $\text{NO}_3$ ) is used to analyze plant-specific plant nutrients. Therefore, to check the plant nutrients more clearly, we must: a field or garden soil to choose the method of analysis of ammonium.  $\text{NH}_4$  or Nitrate  $\text{NO}_3$ .

#### To detect mineral N in the use of ammonium ( $\text{NH}_4$ ) in the land

- Use a vacuum pump 3 ml extract the 2 , 5 ml in glass
- Add 1
- tablespoon of powdered No. 2
- Add 5
- drops of No. 3 liquid, close the lid and shake for 5 minutes.
- If it is
- blue, insert color plate 1; if it is green, insert color plate 2



Pictures of 14-15 , check out the  $\text{NH}_4$

- Analysis of N in the form of nitrate ( $\text{NO}_3$ )
- Suction of 2, 5 ml of soil king in a glass tube
- Add liquid No. 4 to 0, 5 ml
- Add 1 tablespoon of powdered No. 5
- Close the cap of the bottle and leave it for 5 minutes and then read the value with a nitrite color chart



The second 16-17 : how to check out Iron  $\text{NO}_3$

### ການກວດສອບປະລິມານ 'ໄນເຕດ' (N)

**ຫຼອດທີ 1 N**

ແຕ່ງສີມາດຖານ ໄນເຕດ  
STANDARD COLOR CHART FOR NITRATE

H	M	L	VL	O
ສີແດງ	ສີແດງກາງ	ສີແດງເບົາ	ສີແດງຫຼາຍ	ສີຂາວ

1. ດູດນ້ຳຈາກກວດຮອງຮັບ 2.5 ມລ. ໃສ່ລົງໃນຫຼອດແກ້ວ
2. ເຕີມນ້ຳຢາເບີ 4, 0.5 ມລ.
3. ເຕີມຜົງເບີ 5 ໜຶ່ງບ່ອງນ້ອຍ
4. ປິດຝາຫຼອດແກ້ວດ້ວຍຕອນຢາງ
5. ເຊັ່ນໃຫ້ເຂົ້າກັນປະໄວ 5 ນາທີ
6. ອ່ານຄ່າ 'ໄນເຕດ' ໂດຍ

Figure 18: measurement of  $\text{NO}_3$  with the equivalent color

#### 4 P (P) testing



Pictures of the 19 test compounds P

## ການກວດສອບປະລິມານ ‘ຟົດສຟັຣັດ’ (P)



1. ດູດນໍ້າຈາກກວດຮອງຮັບ 2.5 ມລ. ໃສ່ລົງໃນຫຼອດແກ້ວ
2. ເຕີມນໍ້າຢາເບີ 6, 0.5 ມລ.
3. ເຕີມຝັງເບີ 7 ເຄິ່ງບ່ວງນ້ອຍ
4. ປິດຝາຫຼອດແກ້ວດ້ວຍດອນຢາງ
5. ເຊັ່ນໃຫ້ເຂົ້າກັນປະໄວ້ 5 ນາທີ
6. ອ່ານຄ່າ ‘ຟົດສຟັຣັດ’ ໂດຍປຽບທຽບກັບແຜ່ນທຽບສີມາດຕະຖານ ‘ຟົດສຟັຣັດ’

- Drain 2.5 ml of soil extract into a glass tube
- Add bleach number 6 to 0,5 ml
- Add powder No. 7 to half a tablespoon of iron
- closed shake to the left 5 minutes, then read by the color P

### Chemical test ( K )

- First check iron K to mix bleach No. 9 by pulling together 3 ml onto detect poison 9 Shake well for about 5 minutes to chemicals that dissolve all be orange. If you do not use lotion No. 9, you should keep it
- In the refrigerator, the shelf life is 3 months, but if stored normally, it can be used for only 7 days.

## ການກວດສອບປະລິມານ ‘ໂປຕັດຊຽມ’ (K)



1. ດູດນໍ້າກ່ອງ 3 ມລ. ໃສ່ລົງໃນກວດເບີ 9 ຊ້ຳໃຫ້ເຂົ້າກັນ 5 ນາທີ
2. ດູດນໍ້າຈາກກວດຮອງຮັບ 0.8 ມລ.
3. ເຕີມນໍ້າຢາເບີ 8 2.0 ມລ. ຫ້າມຊ້ຳ
4. ເຕີມນໍ້າຢາເບີ 9A ຈຳນວນ 1 ຢອດ ຫ້າມຊ້ຳ
5. ເຕີມນໍ້າຢາເບີ 9 ຈຳນວນ 2 ຢອດ ຫ້າມເກີນ
6. ປິດຝາຫຼອດແກ້ວດ້ວຍດອນຢາງ ຊ້ຳໃຫ້ເຂົ້າກັນ ອ່ານຄ່າ ‘ໂປຕັດຊຽມ’ ທັນທີ ຖ້າມີ ‘ຕະກອນ’ ອ່ານຄ່າ K ສູງ, ຖ້າມີ ‘ຟ້າຂາວ’ ອ່ານຄ່າ K ປານກາງ, ຖ້າບໍ່ມີຕະກອນໃຫ້ປຽບທຽບກັບແຜ່ນທຽບສີມາດຕະຖານ ‘ໂປຕັດຊຽມ’

Figure 20: Mixture of extract



Picture a 21 -step screening test chemicals ( K )

- Suck 0 , 8 ml of soil king water into a glass tube
- Add liquid No. 8 to 2 ml
- Add 1 drop of No. 9 A solution
- Add 2 drops of No. 9 solution
- Close the cap of the glass tube and read the value immediately if there is sediment, it is considered high value , if there is a neutral white cap , if there is no sediment and white cap, the value of k is low compared to K color plate .

## 9 Assess nutrient levels comparable to readable values

Assessment of plant nutrient levels based on the results of the analysis is based on the table of nutrient classification (Tables 1, 2). Determine the fertilizer rate

**Table 1: Rating aluminum compounds, France ( $\text{NH}_4^+$ ) Night terd ( $\text{NO}_3^-$ )**

**In soil from the test results with Soil test Kit**

Level	$\text{NH}_4^+$ blue (mg / kg)	$\text{NH}_4^+$ green (mg / kg)	$\text{NO}_3^-$ (mg / kg)
0	-		0
Lowest ( VL )	0	0	1 -10
Low ( L )	1-5	1-10	-
Medium ( M )	6-15	11-20	11-20
High ( H )	16-30	21-30	21-30
Very high ( VH )	31-50	31-50	31-50

Table 2: Premium level hierarchy (P) from the Audit Soil test Kit

Level	P Available (mg / kg)	K Available (mg / kg)
Low ( L )	<3	0-40
Medium ( M )	3.1-10	41-80
High ( H )	10.1-25	81-120
Very high ( VH )	> 25	-
Note: P and K available are $\text{K}_2\text{O}$ , $\text{P}_2\text{O}_5$		

### Scientific Fertilizer Recommendation ( N, P, K) kg / ha

Soil types	Bond	Very low	Low	Moderate	High	Yield estimated
Earthen soil, Deep soil layer Clayey, Deep Soil	N.	8	4	2		If mixed COF will be higher
	P.		5	4	2	
	K		5	2		
Mud, lava, deep Silty, Deep soil	N.	8	4	2		If mixed COF will be higher
	P.		4	3	2	
	K		4	2	0	
Soil, fine mud Fine, loamy, Deep soil	N.	10	6	4		If mixed COF will be higher
	P.		3	2	1	
	K		2	3	0	



Soil types	Bond	Very low	Low	Moderate	High	Yield estimated
The mud is mixed with coarse parts, Deep soil layer Course loamy, Deep soil	N.	8	4	2		If mixed COF will be higher
	P.		5	4	2	
	K		4	3	1	
Sand, deep Sandy, Deep soil	N.	10	6	2		If mixed COF will be higher
	P.		3	2	1	
	K		4	1	0	
Shallow soil Shallow soil	N.	10	6	2		If mixed COF will be higher
	P.		3	2	1	
	K		3	1	0	
Saline soils Saline soil	N.	10	6	2		If mixed COF will be higher
	P.		3	2	1	
	K		3	1	0	

Example : the mud lab soil depth :

Value Israel (N) : very low P (P.) : low K (K) : Central

- Value ( $\text{NP}_2\text{O}_5\text{-K}_2\text{O}$ )

8-4-2 kg / Ha / Ha 1 = 6.25 charge

8 x 6.25 - 4 x 6.25 - 2 x 6.25 kg / ha

50-25-12.5

Thus: N = 50; P = 25; K = 12.5

**Table 6: Soil acidity rating ( pH )**

Alkalinity values	level
<4.5	Press hard
4.5 - 5.0	Press hard
5.1 - 5.5	Click
5.6 - 6.0	Press the middle
6.1 - 6.5	Press the cane
6.6 - 7.3	Middle
7.4 - 7.8	Alkaline
7.9 - 8.5	Moderate alkalinity
8.6 - 9.0	Strong alkali
> 9.1	Extremely alkaline
( Manual hand for the analysis of soil , water , fertilizers , plant ; page 215)	

## 10 Assessment of lime requirements

Table 7: Demand for cement based content soil each of Gender

Differential pH water	Limestone $\text{CaCO}_3$ (T / ha)			
	Sandy texture	Sandy mud	Mud	Clay soil
5.00-5.49	1	2	2.5	3
4.50-4.99	4	5	6	7
4.00-4.49	7	8	11	13
3.50-3.90	10	12	17	19

### For example, calculating the mortar rate

- Lime  $\text{Ca}(\text{OH})_2$  = limestone  $(\text{CaCO}_3) \times 0.74 \text{ W} / \text{ha}$  ( 0.74 Value Index Edit )
- limestone clay  $\text{CaO}$  or burnt shell = limestone  $(\text{CaCO}_3) \times 0.56 \text{ W} / \text{ha}$  ( 0.56 Value Index Edit )

**Conversion 1:** Need to improve the acidic soil in sandy loam pH ( $\text{H}_2\text{O}$ ) = 5 to a neutral pH = 7 by calculating the lime rate as follows:

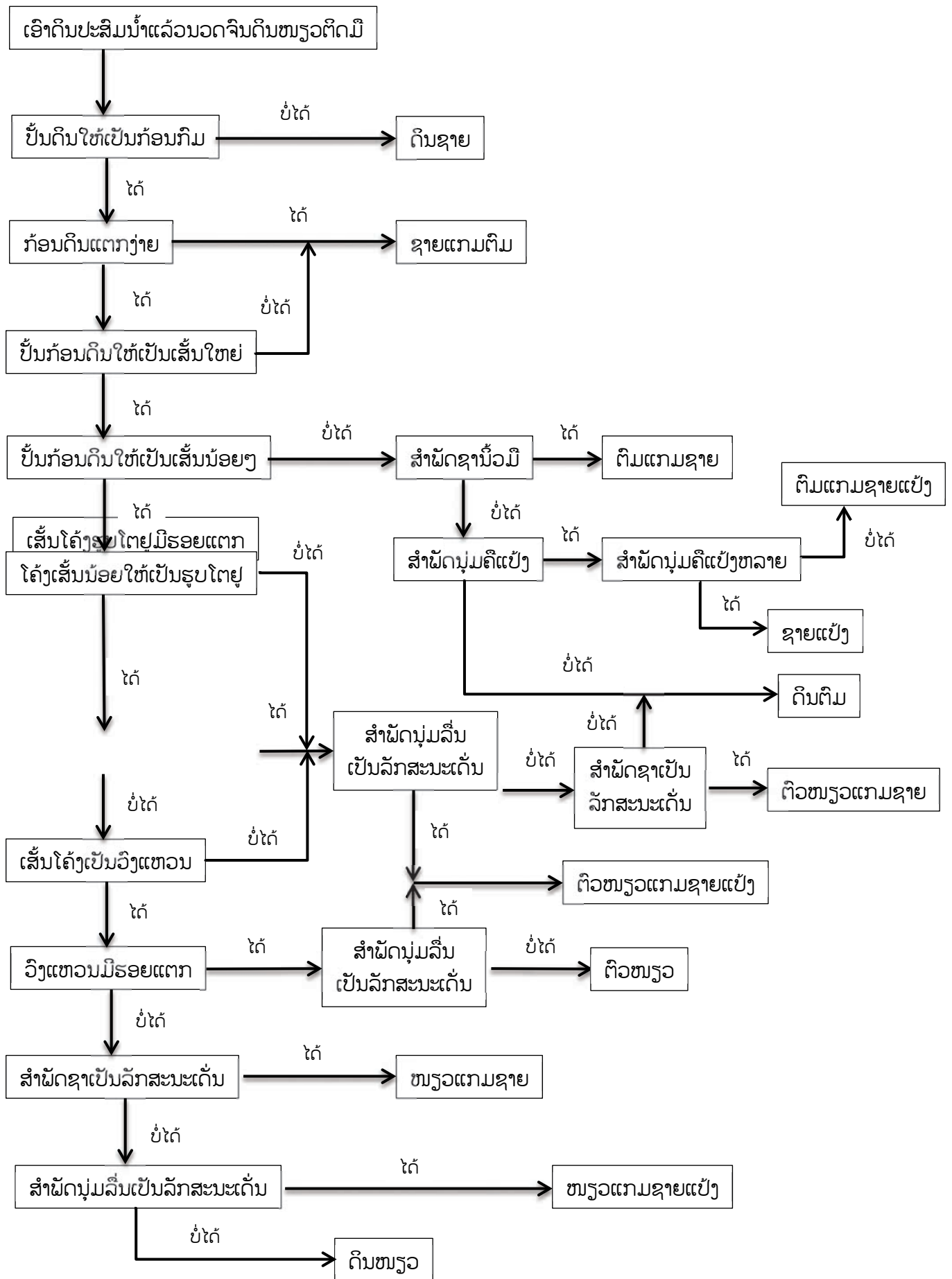
$$\begin{aligned} \text{lime } \text{Ca}(\text{OH})_2 &= \text{limestone } (\text{CaCO}_3) \times 0.74 \text{ W} / \text{ha} \\ &= 2 \times 0.74 \text{ tonnes} / \text{ha} \\ &= 1.48 \text{ meter tonnes} / \text{ha} \end{aligned}$$

Table 8: of the press – pH of the soil with the impact of the trailers the growth of the plants and how to fix the adjustment process Soil (Peverill et al., 1999)

PH value	The incident occurred acid - base and the impact on plant	How to fix the update
<4.6	Land with pH less than 4 and more will be found in the internet account that has output fell more, the land that has a rich low, there is resistance to the change change pH low and land use in agricultural production for many years without maintenance update On the other hand, the loss of nutrients from harvesting a large number of crops each year is one of the reasons why the pH of the soil decreases causing toxic compounds of AL and and Mn useful of Mo down the market wash Ca, Mg, Na and K are more acidic, resulting in decreased microbial activity.	There is a need to cement to improve the law in the land can crop the production well so in areas that are not able to cement came one again at one lime has a price affordable if the assessment of the economy was to be no management fee may be selected nail a plant to improve soil resistant chair to the ground. Click to add organic materials and help reduce land the stones of which are pressing the violent force

## 11 test soil (Soil Texture) :

Soil is a physical property that affects other properties of the soil, such as hardness, ease of tillage, water retention capacity and chemical properties: the utility of plant nutrients. Therefore, knowing the type of land is necessary and important to provide basic information in land use planning that is appropriate to the potential and can be managed properly. Determine the type of clay based system of Food and Agriculture (FAO) has 12 types of content sand (SA), reduced the pay program sqm (LS), content sediment kids (SL), clay mud One changes the kids (SCL), content sediment (L), content sediment kids flour (SIL), content sand powder (Si), clay mud cohesive repairman (SiCL), soil sticky mud (CL), soil cohesive Beach (SC), soil cohesive repairman (SiC) and content clay (C). In addition to taking soil samples to the laboratory to check the type of soil, it can also be checked in the field by using the touch method, which has the following steps:



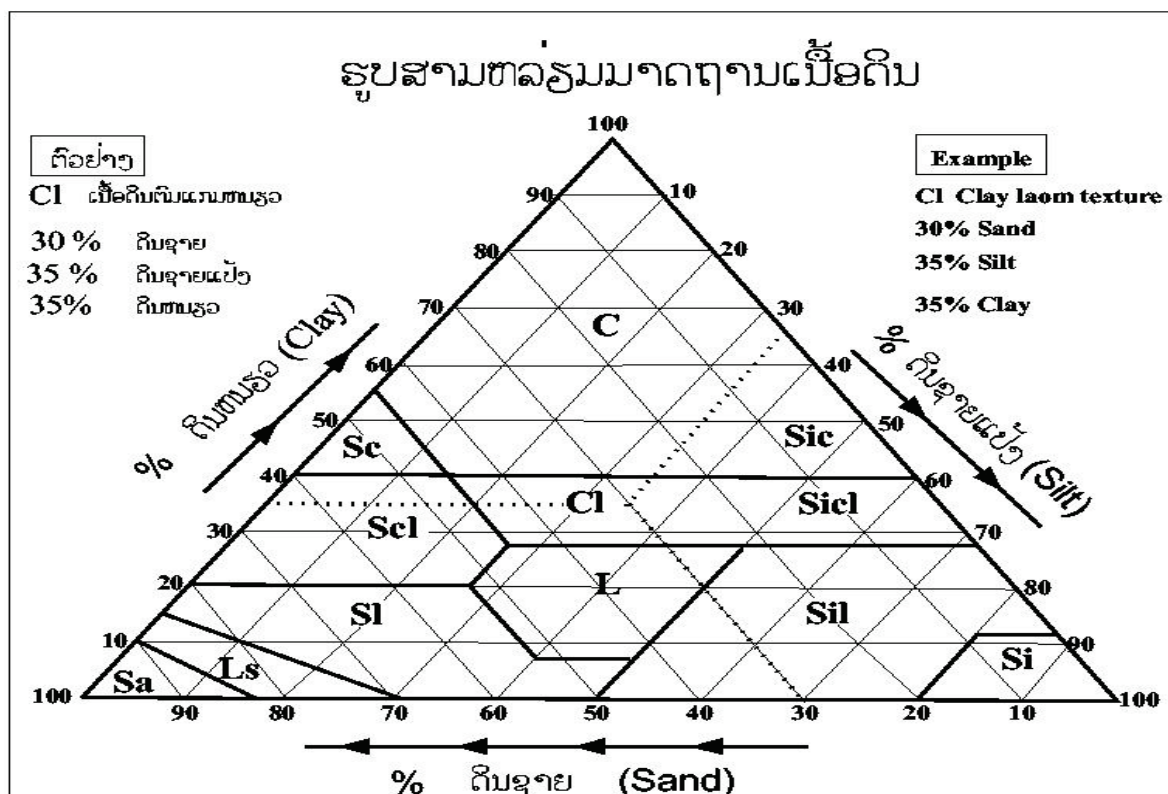


Table 9 : Summary of land types

ລ / ດ	Land type	Code	% Sand	% Powdered sand	% Soil
1	Sandy texture	SA	85-100	0-15	0-10
2	Land for sale	LS	70-90	0-30	0-15
3	Sandy loam soil	SL	45-85	0-50	0-20
4	Sandy loam soil	SCL	45-80	0-28	20-35
5	Mud	L	22-52	28-50	8-28
6	The soil is sandy loam	SiL	0-50	50-80	0-28
7	Powdered sand	Si	0-20	80-100	0-12
8	The clay soil is sandy and sandy	SiCL	0-20	40-72	28-40
9	The muddy soil	CL	20-45	15-52	28-40
10	The sandy soil	SC	45-65	0-20	35-55
11	The soil is fibrous and sandy	SiC	0-20	40-60	40-60
12	Fertile soil	C	0-45	0-40	40-100

Table 10 : The standard of the reactions ( Soil pH<sub>H2O</sub>)

ລ / ດ	pHH 2 O	Interpretation (Lao)	Interpretation (English)	Cause
1	<4.0	Press as hard as you can	Very extremely acid	
2	4.1 - 4.5	Press hard	Extremely acid	

ລ / ອ	pHH 2 O	Interpretation (Lao)	Interpretation (English)	Cause
3	4.6 - 5.0	Press hard	Very strongly acid	
4	5.1 - 5.5	Press hard	Strongly acid	
5	5.6 - 6.0	Press the middle	Moderately acid	
6	6.1 - 6.5	Press lightly	Slightly acid	
7	6.6 - 7.3	Neutral	Neutral	
8	7.4 - 7.9	Mildly alkaline	Slightly alkaline	
9	8.0 - 8.5	Moderately alkaline	Moderately alkaline	
10	8.6 - 9.0	Alkaline	Strongly alkaline	
11	> 9.0	Very alkaline	Very strongly alkaline	

## 12 deep soil (Soil Depth):

Refers to the thickness of the soil layer from the surface down to the solid rock, bedrock or ground water level.

The depth of the soil will be correlated with the depth of the root system of plants in pockets for food and firmly maintained. Digital games with more depth to the growth of plant roots is going to be easy.

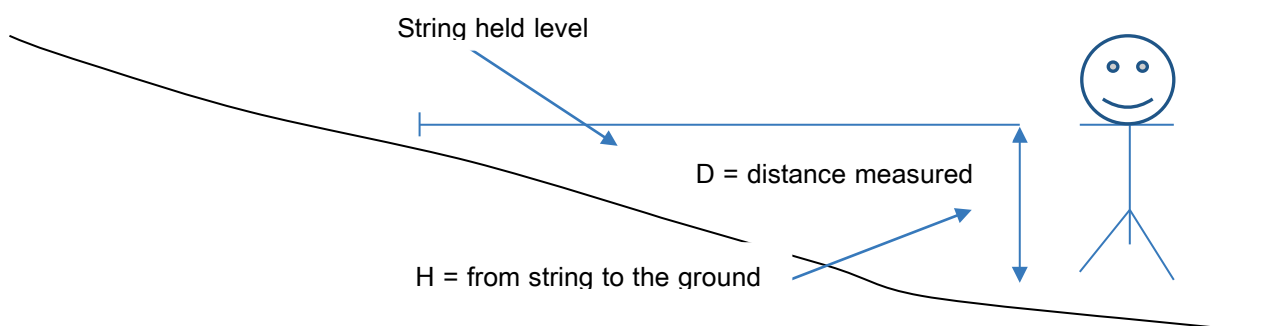
The level of groundwater that would control the growth of the roots of the plant, if the water level underground shallow (near surface) chance root grows into the infrastructure was not possible because of the infrastructure to lack of oxygen, Belarus. Depth of soil to a pan, which impedes rooting (R) more than 30 cm, shallow soil (S) from 31-50 cm, thin soil (T) from 51-75 cm, medium to deep (M) from 76-100 cm and deep (D) More than 100 cm.

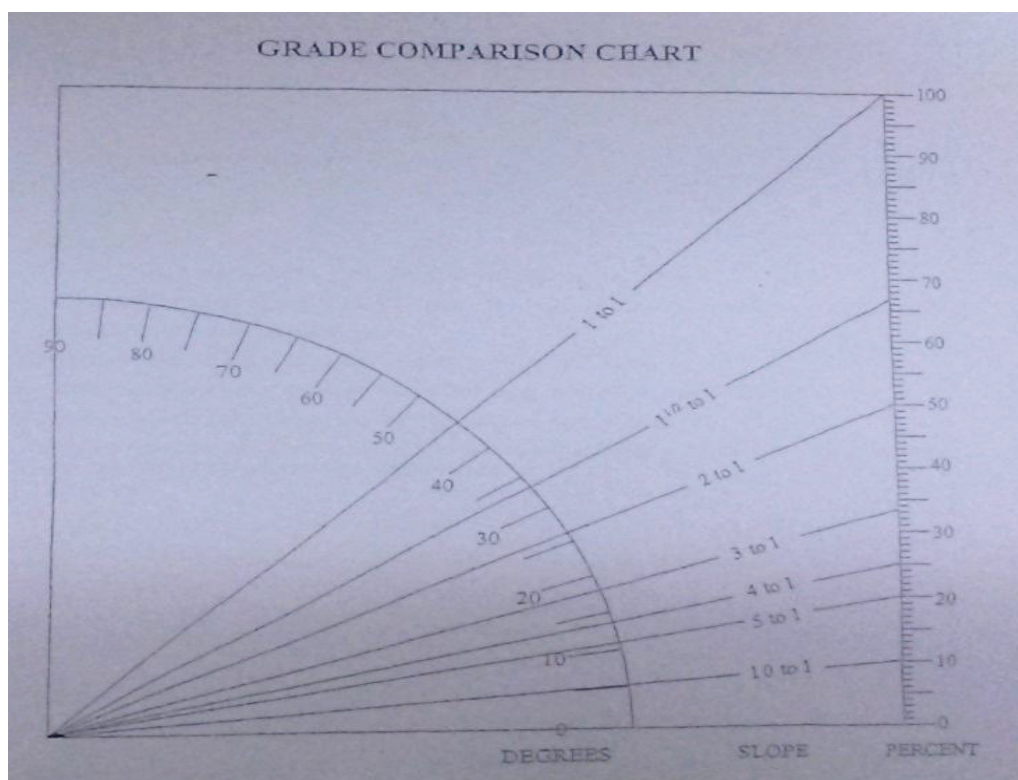
## 13 forest area (Slope):

The scope of the slope and aspect of the slope of the area classification standards into 6 classes is a slope from 0 - 2% (flat or relatively flat), the slope of 2 - 8% ( bumps ), a slope from 8 - 16% ( undulating ), the slope 16 - 30% ( a hill ), a slope from 30 - 55% ( a mountain high ) And a slope of more than 55% ( a very steep mountain ).

### Slope calculation:

**Formula:  $H / D = 100 \times \text{percent range slope (slope in percent)}$**





Source: Cowlitz County Building & Planning Department.

## 14 Soil fertility:

Soil fertility assessment is divided into three levels, based on the chemical and physical properties of the soil as shown in the table below:

Table 11: The evaluation of fertile soil involved:

Class stamps complete Of soil	Soil acidity (pH)	Nitrogen (% N)	Phosphate and Florida State useful (ppm)	Useful potassium (K <sub>2</sub> Omg / 100g of soil)	Land (Soil Texture)	Opinions of villagers
Low Low (L)	<4.5 > 7.3  (1)	<0.15  (1)	<10  (1)	<4.0  (1)	- Male - Mud sand - Sand in the sand - Powdered sand (1)	The soil is bad  (1)
Moderate Medium (M)	4.6 - 5.5  (2)	0.16 - 0.25  (2)	10-18  (2)	4.0-12.0  (2)	- Male organ - Mud - Phieu sand - Spread sand powder - ?? (2)	Moderate  (2)
High High (H)	5.6 - 7.3  (3)	> 0.25  (3)	> 18  (3)	> 12.0  (3)	- Mud - Powdered sand - Powdered mud and sand (3)	Good soil  (3)



How to calculate the level of fertility of soil by the score, by summarizing the take gold in a Games in parentheses such as (1), (2) and (3) upon the factors listed in the table if the score of the But the score 6 - 8 with a range of rich low (L).

Scores from 9-13 have a moderate level of fertility (M).

Scores from 14-18 have a high fertility level (H).

For the depth of the soil layer and the level of the slope of the area, the assessment from the actual field area should be used to support the decision to determine the soil fertility boundary to create a participatory soil fertility assessment map.

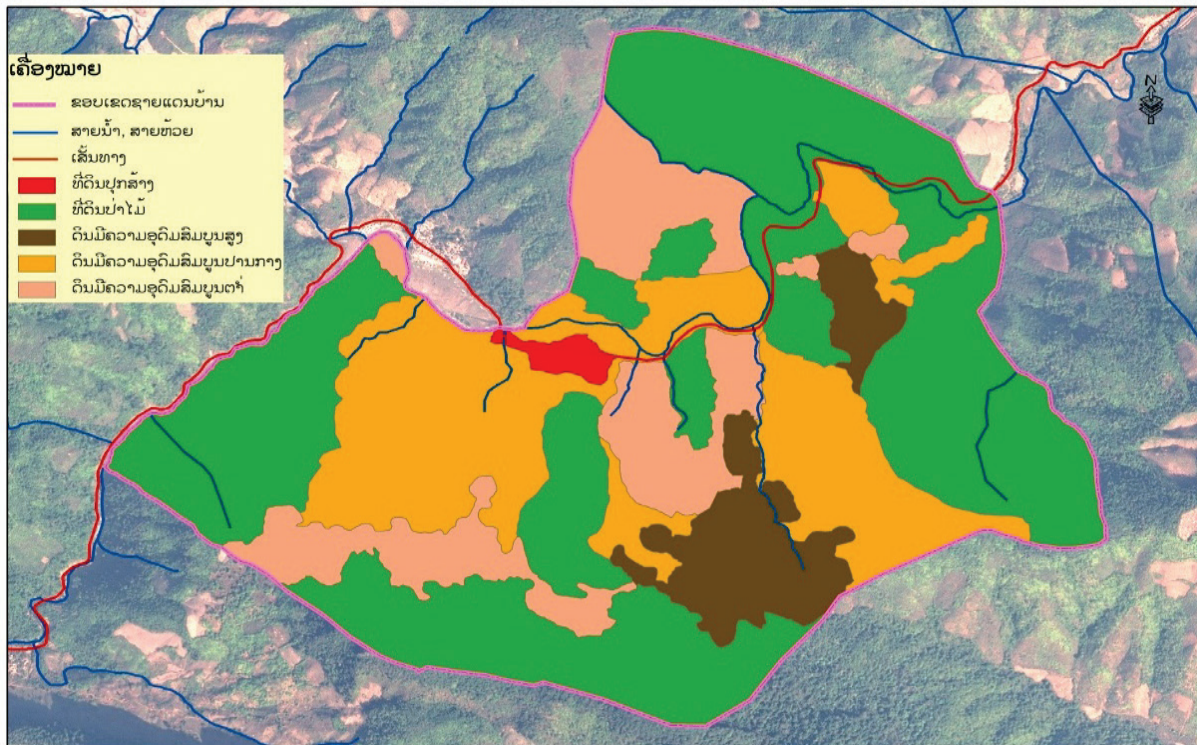
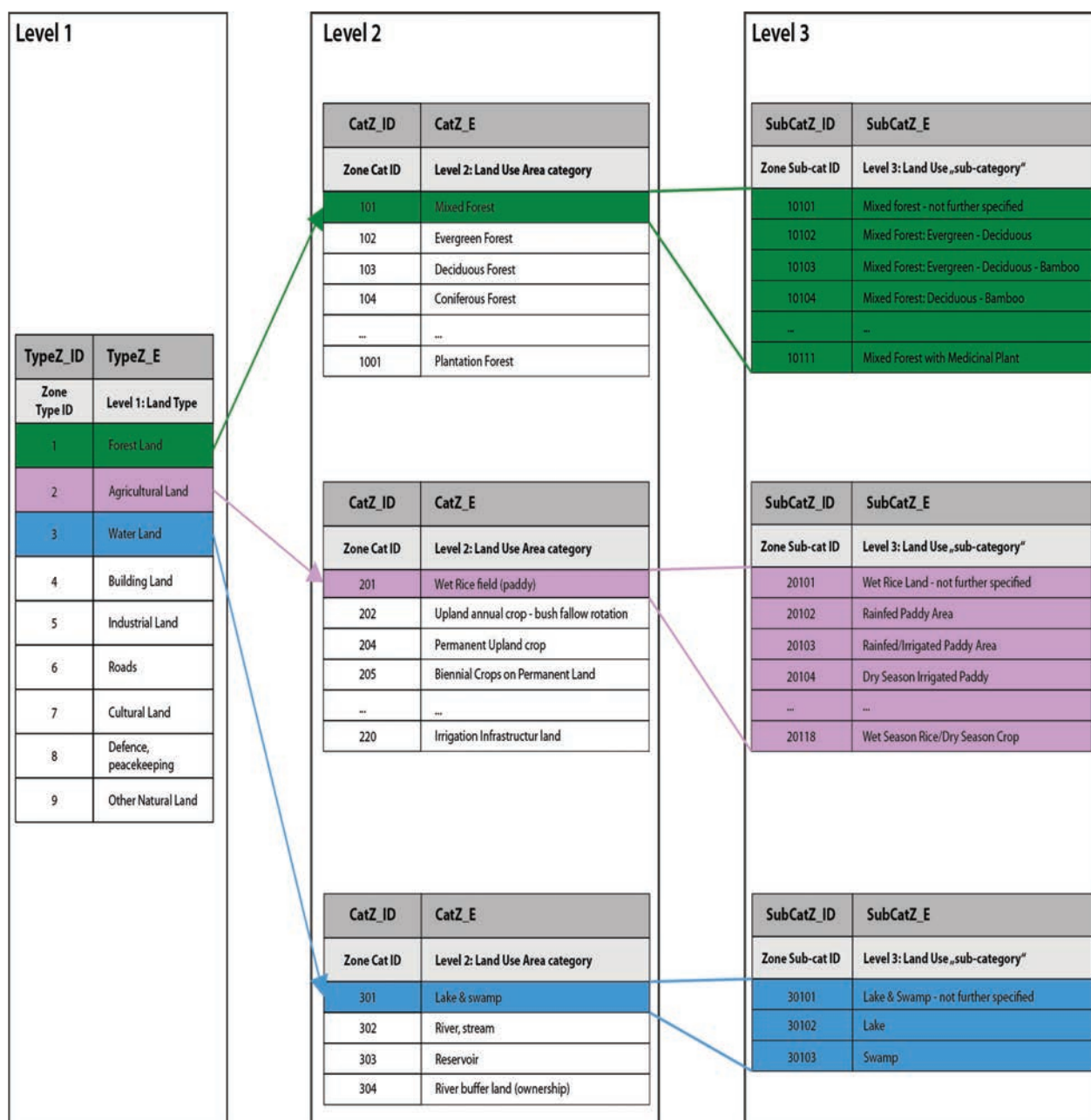


Figure 6: Participatory soil fertility assessment map





















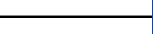




## Annex V: Land classification system and color code


### 1. Overview of Land classification system for current land use and forest cover (CLU/FC)






































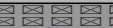




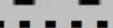
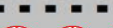


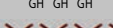















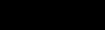




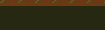
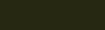







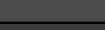

## 2. Land Classes of “Current Land Use and Forest Cover

1: Land Classes of "Current Land Use and Forest Cover"					"Version 1-17" (version of January 2017)		
Type ID	Type	CatID	Category	Color	Sub_Cat_ID	Sub_Category	Color
1	Current Forest	101	Mixed Forest	10,135,20	10101	Mixed Forest - not further specified	
					10102	Mixed Forest: Evergreen - Deciduous	
					10103	Mixed Forest: Evergreen - Deciduous - Bamboo	
					10104	Mixed Forest: Deciduous - Bamboo	
					10105	Mixed Forest: Broad leaf - Coniferous	
					10106	Riparian forest	
					10107	Mixed Forest with rattan	~ ~ ~ ~ ~
					10108	Mixed Forest with Cardamom	CA CA CA CA
					10109	Mixed Forest with Kisi	KS KS KS KS
					10110	Mixed Forest with BongBark trees	BB BB BB BB
					10111	Mixed Forest with Medicinal Plant	MP MP MP MP
					10112	Mixed Forest with Cattle grazing	
					10199		
		102	Evergreen Forest	0,95,5	10201	Evergreen Forest - not further specified	0,95,5
					10202	Evergreen Forest: Moist, closed	
					10203	Evergreen Forest: Dry, not closed	
					10204	Evergreen Forest with rattan	~ ~ ~ ~ ~
					10205	Evergreen Forest with Mak Jong	MJ MJ MJ
					10206	Evergreen Forest with Wild Tea	TEA TEA TEA
					10207	Evergreen Forest with Cattle grazing	
					10299		
		103	Deciduous Forest	10,170,20	10301	Deciduous Forest - not further specified	
					10302	Dry Deciduous Forest	
					10303	Bamboo Forest	
					10304	Deciduous mixed with stone/rock	
					10305	Deciduous underlain by grass	
					10306	Savannah	
					10307	Deciduous Forest with stones	
					10308	Deciduous Forest with sand	
					10309	Deciduous Forest with flat rock	
					10310	Deciduous Forest with Cattle grazing	
					10311	Dry Deciduous Forest with Cattle grazing	
					10399		
		104	Coniferous Forest	120,170,100	10401	Coniferous Forest - not further specified	
					10402	Closed Coniferous Forest	
					10403	Coniferous Forest underlain by grass	
					10404	Coniferous Forest with Cattle grazing	
					10499		















DEML	Level 1: Land Type:		Level 2: Land Use Area cate	Color		Level 3: Land Use "sub-category"	
10	Timber Tree Plantation	109	Timber Tree Plantation	155,185,90	10901	Timber Tree Plantation - not further specified	
					10902	Timber Tree Plantation: Teak	TE TE TE TE
					10903	Timber Tree Plantation: Hardwoods	HW HW HW HW
					10904	Timber Tree Plantation: Eucalyptus	EC EC EC EC
					10905	Timber Tree Plantation: Softwood	SW SW SW SW
					10906	Timber Tree Plantation: Acacia aurcaliformis\mangium	AA AA AA AA
					10906	Timber Tree Plantation: Mai Dtiew	
2	Agriculture Land	201	Wet Rice field (paddy)		20101	Wet Rice Land - not further specified	
					20102	Rainfed Paddy Area	
					20103	Rainfed/Irrigated Paddy Area	
					20104	Dry season Irrigated Paddy	
					20105	Draw down paddy	
					20106	Land reserved for new paddy	
					20107	Abandoned paddy	
					20108	Wet season rice/ dry season crop	
						For villages without upland farming	
					20111	Wet Rice Land - not further specified	
					20112	Rainfed Paddy Area	
					20113	Rainfed/Irrigated Paddy Area	
					20114	Dry season Irrigated Paddy	
					20115	Draw down paddy	
					20116	Land reserved for new paddy	
					20117	Abandoned paddy	
					20118	Wet season rice/ dry season crop	
		202	Upland annual crop - bush fallow rotation	255,255,75	20201	Upland crop field (yr of image) - not further specified	
					20202	Upland rice field (year of image)	ເຂົ້າໄຂ່ ເຂົ້າໄຂ່ ເຂົ້າໄຂ່
					20203	Upland maize field (year of image)	ໄຂ່ສາວີ ໄຂ່ສາວີ ໄຂ່ສາວີ
					20204	Upland cassava field (year of image)	ມັນຕົ້ນ ມັນຕົ້ນ ມັນຕົ້ນ
					20205	Upland Job's tears field (year of image)	ໝາກເດືອນ ໝາກເດືອນ
					20206	Upland Sesame field (year of image)	ໝາກງາ ໝາກງາ ໝາກງາ
					20207	Other upland crop field (year of image)	ເພັດຫົງ ເພັດຫົງ
					20210	Bush fallow - not further specified	
					20211	Bush fallow: 1 year old (year of image -1)	ບ່າວດ 1ປີ
					20212	Bush fallow older than 1 year (year of image ->1)	
					20221	Bush fallow of Yarn	ບ່າວດ ມີຍານ
					20222	Bush fallow of Bamboo	ບ່າວດ ໄມ້ປ່ອງ
					20223	Bush fallow of Mieng	ບ່າວດ ມີຊາ
					20224	Bush fallow of Bong	ບ່າວດ ມີຍາງບົງ

DEML	Level 1: Land Type:		Level 2: Land Use Area cate	Color		Level 3: Land Use "sub-category"	
		204	Annual Crops on permanent land	A A A A	20401	Annual Crop Permanent Land - not further specified	A A A A A A
					20402	Maize	AMZ AMZ AMZ
					20403	Sesame	ASS ASS ASS
					20404	Job's tears	AJT AJT AJT
					20405	Potato	APT APT APT
					20406	Soy Bean	ASB ASB ASB
					20407	Mungbean	AMB AMB AMB
					20408	Vegetable	AVT AVT AVT
					20409	Sweet Potato	ASP ASP ASP
					20410	Ground nut	AGN AGN AGN
					20411	Tobacco	ATB ATB ATB
					20412	Cotton	ACT ACT ACT
		205	Biennial Crops on Permanent Land	B B B B B	20501	Biennial Crops on Permanent Land - not further specified	B B B B B
					20502	Cassava	BCV BCV BCV
					20503	Sugar cane	BSC BSC BSC
					20504	Papaya	BPP BPP BPP
					20505	Banana	BBN BBN BBN
					20506	Pineapple	BPA BPA BPA
					20507	Roselle	BRS BRS BRS
		206	Fruit- and nut tree and Perennial Crops		20601	Fruit, nut tree, perennial Crops - not further specified	
					20602	Fruit tree	FT FT FT FT
					20603	Citrus	CT CT CT CT
					20604	Mango	MG MG MG MG
					20605	Lychee	LY LY LY LY
					20606	Longan	LO LO LO LO
					20607	Sapodilla	SO SO SO SO
					20608	Chestnut	CN CN CN CN
					20609	Coconut	CC CC CC CC
					20610	Cashew	CW CW CW CW
					20651	Rattan	~ ~ ~ ~
					20652	Bamboo	BB BB BB BB
					20653	Coffee	CF CF CF CF
					20654	Tea	TEA TEA TEA
					20655	Jatropha	JT JT JT JT
					20656	Mulberry	MB MB MB MB
					20657	Inca Bean	IB IB IB IB
					20658	Bastard Cardamon	CA CA CA CA
		207	Agro-Forestry		20701	Agro-Forestry - not further specified	
					20702	Agro-Forestry - Coffee under Forest	CF CF CF
					20703	Agro-Forestry - Cardamom under Forest	CA CA CA CA
					20704	Agro-Forestry - Tea under Forest	QT QT QT QT
					20751	Agro-Forestry Tree Plantation: Rubber	RB RB RB RB
					20752	Agro-Forestry Tree Plantation: Eaglewood (Aquilaria cras)	AC AC AC AC
					20753	Agro-Forestry Tree Plantation: BongBark Trees	BB BB BB BB
					20754	Agro-Forestry Tree Plantation: Oil palm	OP OP OP OP
					20755	Agro-ForestryTree Plantation: Tung oil tree	TO TO TO TO






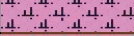







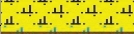



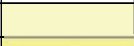




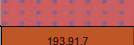



DEML	Level 1: Land Type:		Level 2: Land Use Area cate	Color		Level 3: Land Use "sub-category"	
		209	Other Crop Land: various	193,91,7	20901	Other/mixed Agricultural Land	
		210	Livestock raising and grazing land		21001	Livestock Raising, Grazing Land - not further specified	
					21002	Pasture Livestock Area	
					21003	Natural Grassland Livestock Area	
		211	Livestock raising in pens/farm		21101	Livestock raising in pens/farm - not further specified	
					21102	Livestock raising in pens/farm: Pigs	
					21103	Livestock raising in pens/farm: Chicken	
					21104	Livestock raising in pens/farm: Pigs over fishpond	
					21105	Livestock raising in pens/farm: Cattle	
		212	Fish and shrimp pond		21201	Fish and shrimp Pond - not further specified	
					21202	Fish Pond	
					21203	Shrimp Pond	
					21204	Fish Pond with Fruit tree	
		220	Irrigation Infrastructure land		22001	Irrigation Infrastructure Land - not further specified	
					22002	Weir	
					22003	Main canal	
					22004	Secondary canal	
3	Water Land	301	Lake & swamp		30101	Lake & Swamp - not further specified	
					30102	Lake	
					30103	Swamp	
		302	River, stream		30201	River, Stream	
					30202	River	
					30203	Stream	
					30204	Fish Conservation Reserve	
					30205	Sacred Swamp/Lake	
		303	Reservoir		30301	Reservoir	
		304	River buffer land (ownership)		30401	Riverside Reserve Land (Ownership)	
4	Building Land	401	Built Up Area		40101	Built Up Area - not further specified	
		402	Private building land		40201	Private Building Land	
		403	State building land		40301	State Building Land	
		404	Reserve building land	RL	40401	Reserve Building Land	RL RL RL RL
		405	Buildings in Settlement Zones		40501	Buildings in Settlement Zones	
					40502	School land	
					40503	Market land	
					40504	Hospital & Health Care Center land	
					40505	Commercial land	
					40506	Hotel, Guesthouse land	GH GH GH GH
					40507	Rubbish Tip/Landfill	
					40508	Sports Fields	

DEML	Level 1: Land Type:		Level 2: Land Use Area cate	Color		Level 3: Land Use "sub-category"	
5	Industrial Land	501	Mining and quarry sites	MQ	50101	Mining and Quarry Site	MQ MQ MQ
					50102	Salt Mine	SM SM SM
					50103	Stone Quarry	SQ SQ SQ
					50104	Sand Quarry	SY SY SY
		502	Industrial Land	FY	50201	Industrial Land	FY FY FY
		503	Hydropower dam and land	HP	50301	Hydropower dam and land	HP HP HP
		504	Electricity Generating Stati	EG	50401	Electricity Generating Station	EG EG EG
					50402	Solar power site	  
					50403	Wind power site	  
		505	Electricity Transmission/M	TL	50501	High Voltage Transmission Line	HV HV HV
6	Roads	601	Paved road		60101	Paved Road	
			Unpaved road		60201	Unpaved Road	
		603	Reserve for new road		60301	Reserve For New Road	
		604	Railway alignment		60401	Railway Alignment	
		605	Transportation station land		60501	Transportation Station Land	
		606	Source of soil/gravel for road		60601	Source Of Soil/Gravel For Road Construction	
7	Cultural Land	701	Temple etc (place of worshi	CR	70101	Cultural Buildings And Sites	CR CR CR
		702	Spiritual areas	SF	70201	Sacred Forest	SF SF SF
					70202	Cemetery Forest	
		703	Historic & Historic tourist sites		70301	Historic or Religious Tourist Sites	
					70302	Nature/Eco Tourist Sites	
8	Defence, peacekeeping	801	Defence and security facilities		80101	Military Facility	
		802	Military and police strategy land		80102	Police Facility	
9	Other Natural Lands	901	Other Natural vegetation	200,220,100	90101	Other Vegetated Land	
					90102	Natural Savanna/Grassland	
					90103	Natural Shrublands	
		902	Unvegetated Lands	90,90,90	90201	Unvegetated Lands	
					90202	Barren Land (natural)	
					90203	Barren Land (human made)	
					90204	Rock Landscapes	

### 3. Land Classes of “Forest and Land Use Management Zonation “ (FLUMZ)
























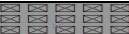











Type ID	Type	Zone Cat ID	Management Zone Category	📏		Management and Use Zone sub-category	Color
Z_1	Forest Land	Z_101	Managed Use Forest Land Zone	10,170,20	Z_10101	Managed Use Forest - not further specified	10,170,20
					Z_10102	Managed Use Forest - General Purpose	
					Z_10103	Managed Use Forest - For Bamboo	
					Z_10104	Managed Use Forest - For Timber	
					Z_10105	Managed Use Forest - For Livestock	
					Z_10106	Managed Use Forest - Rattan	~ ~ ~ ~ ~
					Z_10107	Managed Use Forest - Cardamom	CA CA CA CA CA
					Z_10108	Managed Use Forest - Kisi	KS KS KS KS KS
					Z_10109	Managed Use Forest - Bong Bark trees	BB BB BB BB BB
					Z_10110	Managed Use Forest - Medicinal Plant	MP MP MP MP MP
					Z_10111	Managed Use Forest - wild tea	ꠘꠘ ꠘꠘ ꠘꠘ
		Z_102	Conservation Forest Land Zone	0,69,0	Z_10201	Village Biodiversity Conservation Forest	
					Z_10202	Conservation and NTFP forest	
		Z_103	Watershed Protection Forest Land Zone		Z_10301	Village Watershed Protection Forest	
					Z_10302	Riparian Protection Forest	
					Z_10303	Controlled use zone in Protection Forest - general	
					Z_10304	Controlled use zone in Protection Forest - cardamon	
					Z_10305	State Watershed Protection Forest	
		Z_104	Other Protection Forest Land Zone		Z_10401	Protection Forest - not further specified	
					Z_10402	Roadside Protection Forest	
					Z_10403	Border Protection Forest	
Z_10		Z_109	Timber Tree Plantation Land Zone	155,185,90	Z_10901	Timber Tree Plantation - not further specified	155,185,90
					Z_10902	Timber Tree Plantation: Teak	TE TE TE TE
					Z_10901	Timber Tree Plantation: Hardwoods	HW HW HW
					Z_10901	Timber Tree Plantation: Eucalyptus	EC EC EC EC
					Z_10901	Timber Tree Plantation: Softwood	SW SW SW
					Z_10901	Timber Tree Plantation: Acacia aurcaliformis\mangium	AA AA AA AA
						Timber Tree Plantation: Mai Dtiew	

Zone Type ID	Type	Color	Zone Cat ID	Cat Z - Management Zone Category	Color	SubCatZ_ID	SubCatZ_E: Management and Use Zone sub-category	Color
			Z_203	Irrigation Infrastructure land zone		Z_20301	Irrigation Infrastructure Land	
			Z_204	Cropping land zone - mixed/various	193,91.7	Z_20401	Cropping land Zone - mixed: uplands and fallow	193,91.7
						Z_20402	Cropping land Zone - mixed: fixed or lowland	180,80.5
						Z_20403	Cropping land Zone - mixed annual/bienial	160,70.5
						Z_20420	Crop land zone: mixed annual/bienial/perenial	145,60.5
			Z_205	Upland annual crop/fallow rotation Zone (1yr planting phase)		Z_20501	Annual Rotation Crop Zone: Year 1 (specify year)	ปี 1
						Z_20502	Annual Rotation Crop Zone: Year 2 (specify year)	ปี 2
						Z_20503	Annual Rotation Crop Zone: Year 3 (specify year)	ปี 3
						Z_20504	Annual Rotation Crop Zone: Year 4 (specify year)	ปี 4
						Z_20505	Annual Rotation Crop Zone: Year 5 (specify year)	ปี 5
						Z_20506	Annual Rotation Crop Zone: Year 6 (specify year)	ปี 6
						Z_20507	Annual Rotation Crop Zone: Year 7 (specify year)	ปี 7
						Z_20508	Annual Rotation Crop Zone: Year 8 (specify year)	ปี 8
						Z_20509	Annual Rotation Crop Zone: Year 9 (specify year)	ปี 9
			Z_206	Upland annual crop/fallow rotation Zone (2yr planting phase)		Z_20601	Annual Rotation Crop Zone: Yr 1 + 2 (specify years)	ปี 1 - ปี 2
						Z_20602	Annual Rotation Crop Zone: Yr 3 + 4 (specify years)	ปี 3 - ปี 4
						Z_20603	Annual Rotation Crop Zone: Yr 5 + 6 (specify years)	ปี 5 - ปี 6
						Z_20604	Annual Rotation Crop Zone: Yr 7 + 8 (specify years)	ปี 7 - ปี 8
						Z_20605	Annual Rotation Crop Zone: Yr 9 + 10 (specify years)	ปี 9 - ปี 10
						Z_20606	Annual Rotation Crop Zone: Yr 11 + 12 (specify years)	ปี 11 - ปี 12
			Z_215	Upland annual crop/fallow rotation Zone (1-2yr planting phase)		Z_21501	Annual Rotation Crop Zone: Yr 1 + 2 (specify years)	ปี 1 - ปี 2
						Z_21502	Annual Rotation Crop Zone: Yr 2 + 3 (specify years)	ปี 2 - ปี 3
						Z_21503	Annual Rotation Crop Zone: Yr 3 + 4 (specify years)	ปี 3 - ปี 4
						Z_21504	Annual Rotation Crop Zone: Yr 4 + 5 (specify years)	ปี 4 - ปี 5
						Z_21505	Annual Rotation Crop Zone: Yr 5 + 6 (specify years)	ปี 5 - ปี 6
						Z_21506	Annual Rotation Crop Zone: Yr 6 + 7 (specify years)	ปี 6 - ปี 7
			Z_207	Fixed Annual Cropland Zone		Z_20701	Annual Crop Zone - permanant land (not further specified)	250,150.70
						Z_20702	Maize	AMZ AMZ AMZ
						Z_20703	Sesame	ASS ASS ASS
						Z_20704	Job's tears	AJT AJT AJT
						Z_20705	Potato	APT APT APT
						Z_20706	Soy Bean	ASB ASB ASB
						Z_20707	Mungbean	AMB AMB AMB
						Z_20708	Vegetable	AVT AVT AVT
						Z_20709	Sweet Potato	ASP ASP ASP
						Z_20710	Ground nut	AGN AGN AGN
						Z_20711	Tobaco	ATB ATB ATB
			Z_208	Bi-Annual fixed Cropland zones		Z_20801	Bi-Annual Crop Permanent Land (1-3 years)	B B B B B
						Z_20802	Cassava	BCV BCV BCV
						Z_20803	Sugar cane	BSC BSC BSC
						Z_20804	Papaya	BPP BPP BPP
						Z_20805	Rattan	BRT BRT BRT
						Z_20806	Pineapple	BPA BPA BPA
						Z_20807	Roselle	BRS BRS BRS
						Z_20808	Cotton	BCT BCT BCT
						Z_20809		

Type ID	Type	Zone Cat ID	Management Zone Category			Management and Use Zone sub-category	Color
Z_2	Agriculture Land	Z_201	Wet Rice Land Zone		Z_20101	Wet Rice Paddy land zone - not further specified	
					Z_20102	Rainfed Paddy land zone	
					Z_20103	Dry season Irrigated Paddy land zone	
					Z_20104	Rainfed/Irrigated Paddy land zone	
					Z_20105	Draw down paddy land zone	
					Z_20106	Wet season Paddy and dry season crop zone	
					Z_20107	Land For Paddy Expansion zone	
						For villages without upland farming	
					Z_20111	Wet Rice Paddy land zone - not further specified	
					Z_20112	Rainfed Paddy land zone	
					Z_20113	Dry season Irrigated Paddy land zone	
					Z_20114	Rainfed/Irrigated Paddy land zone	
					Z_20115	Draw down paddy land zone	
					Z_20116	Wet season Paddy and dry season crop zone	
					Z_20117	Land For Paddy Expansion zone	
		Z_202	Livestock raising and grazing land Zone		Z_20201	Livestock Raising, Grazing land	
					Z_20202	Pasture Livestock land	
					Z_20203	Natural Grassland livestock land	
					Z_20204	Other Livestock Raising land	
		Z_203	Irrigation Infrastructure land zone		Z_20301	Irrigation Infrastructure land	
		Z_204	Cropping land zone - mixed/various	193,91.7	Z_20401	Cropping land Zone - mixed: uplands and fallow	193,91.7
					Z_20402	Cropping land Zone - mixed: fixed or lowland	180,80.5
					Z_20403	Cropping land Zone - mixed annual/bienial	160,70.5
					Z_20420	Crop land zone: mixed annual/bienial/perennial	145,60.5
		Z_205	Upland annual crop/fallow rotation Zone (1yr planting phase)		Z_20501	Annual Rotation Crop Zone: Year 1 (specify year)	ປີທີ 1
					Z_20502	Annual Rotation Crop Zone: Year 2 (specify year)	ປີທີ 2
					Z_20503	Annual Rotation Crop Zone: Year 3 (specify year)	ປີທີ 3
					Z_20504	Annual Rotation Crop Zone: Year 4 (specify year)	ປີທີ 4
					Z_20505	Annual Rotation Crop Zone: Year 5 (specify year)	ປີທີ 5
					Z_20506	Annual Rotation Crop Zone: Year 6 (specify year)	ປີທີ 6
					Z_20507	Annual Rotation Crop Zone: Year 7 (specify year)	ປີທີ 7
					Z_20508	Annual Rotation Crop Zone: Year 8 (specify year)	ປີທີ 8
					Z_20509	Annual Rotation Crop Zone: Year 9 (specify year)	ປີທີ 9
		Z_206	Upland annual crop/fallow rotation Zone (2yr planting phase)		Z_20601	Annual Rotation Crop Zone: Yr 1 + 2 (specify years)	ປີທີ 1 - ປີທີ 2
					Z_20602	Annual Rotation Crop Zone: Yr 3 + 4 (specify years)	ປີທີ 3 - ປີທີ 4
					Z_20603	Annual Rotation Crop Zone: Yr 5 + 6 (specify years)	ປີທີ 5 - ປີທີ 6
					Z_20604	Annual Rotation Crop Zone: Yr 7 + 8 (specify years)	ປີທີ 7 - ປີທີ 8
					Z_20605	Annual Rotation Crop Zone: Yr 9 + 10 (specify years)	ປີທີ 9 - ປີທີ 10
					Z_20606	Annual Rotation Crop Zone: Yr 11 + 12 (specify years)	ປີທີ 11 - ປີທີ 12
		Z_215	Upland annual crop/fallow rotation Zone (1-2yr planting phase)		Z_21501	Annual Rotation Crop Zone: Yr 1 + 2 (specify years)	ປີທີ 1 - ປີທີ 2
					Z_21502	Annual Rotation Crop Zone: Yr 2 + 3 (specify years)	ປີທີ 2 - ປີທີ 3
					Z_21503	Annual Rotation Crop Zone: Yr 3 + 4 (specify years)	ປີທີ 3 - ປີທີ 4
					Z_21504	Annual Rotation Crop Zone: Yr 4 + 5 (specify years)	ປີທີ 4 - ປີທີ 5
					Z_21505	Annual Rotation Crop Zone: Yr 5 + 6 (specify years)	ປີທີ 5 - ປີທີ 6
					Z_21506	Annual Rotation Crop Zone: Yr 6 + 7 (specify years)	ປີທີ 6 - ປີທີ 7







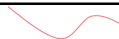


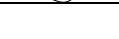



Type ID	Type	Zone Cat ID	Management Zone Category	🌱	Management and Use Zone sub-category	Color	
		Z_207	Fixed Annual Cropland Zone		Z_20701	Annual Crop Zone - permanent land - not further specified	250,150,70
					Z_20702	Maize	AMZ AMZ AMZ
					Z_20703	Sesame	ASS ASS ASS
					Z_20704	Job's tears	AJT AJT AJT
					Z_20705	Potato	APT APT APT
					Z_20706	Soy Bean	ASB ASB ASB
					Z_20707	Mungbean	AMB AMB AMB
					Z_20708	Vegetable	AVT AVT AVT
					Z_20709	Sweet Potato	ASP ASP ASP
					Z_20710	Ground nut	AGN AGN AGN
					Z_20711	Tobacco	ATB ATB ATB
					Z_20712	Cotton	ACT ACT ACT
					Z_20751	Annual crop zone with SALT (Sloping agricultural land technology)	250,150,70
					Z_20752	Annual crop zone with SALT: Maize	AMZ AMZ AMZ
					Z_20753	Annual crop zone with SALT: Sesame	ASS ASS ASS
					Z_20754	Annual crop zone with SALT: Job's tears	AJT AJT AJT
					Z_20755	Annual crop zone with SALT: Potato	APT APT APT
					Z_20756	Annual crop zone with SALT: Soy Bean	ASB ASB ASB
					Z_20757	Annual crop zone with SALT: Mungbean	AMB AMB AMB
					Z_20758	Annual crop zone with SALT: Vegetable	AVT AVT AVT
					Z_20759	Annual crop zone with SALT: Sweet Potato	ASP ASP ASP
					Z_20760	Annual crop zone with SALT: Ground nut	AGN AGN AGN
					Z_20761	Annual crop zone with SALT: Tobacco	ATB ATB ATB
					Z_20762	Annual crop zone with SALT: Cotton	ACT ACT ACT
		Z_208	Biennial fixed Cropland Zone		Z_20801	Biennial Crop Permanent Land (1-3 years) - not further specified	B B B B B B
					Z_20802	Cassava	BCV BCV BCV
					Z_20803	Sugarcane	BSC BSC BSC
					Z_20804	Papaya	BPP BPP BPP
					Z_20805	Pineapple	BPA BPA BPA
					Z_20806	Roselle	BRS BRS BRS
					Z_20807	Banana	BBN BBN BBN BBN
		Z_209	Fruit- and nut tree and Perennial Crops		Z_20901	Fruit- and nut tree and perennial crops - not further specified	🌳 🌳 🌳 🌳 🌳 🌳
					Z_20902	Fruit tree	FT FT FT FT FT FT
					Z_20903	Citrus	CT CT CT CT CT CT
					Z_20904	Mango	MG MG MG MG MG MG
					Z_20905	Lychee	LY LY LY LY LY LY
					Z_20906	Longan	LO LO LO LO LO LO
					Z_20907	Sapodilla	SD SD SD SD SD SD
					Z_20908	Chestnut	CN CN CN CN CN CN
					Z_20909	Coconut	CC CC CC CC CC CC
					Z_20910	Cashew	CN CN CN CN CN CN
					Z_20951	Rattan	~ ~ ~ ~ ~ ~
					Z_20952	Bamboo	BB BB BB BB BB BB
					Z_20953	Coffee	CF CF CF CF CF CF
					Z_20954	Tea	TEA TEA TEA TEA TEA TEA
					Z_20955	Jatropha	JT JT JT JT JT JT
					Z_20956	Mulberry	MB MB MB MB MB MB
					Z_20957	Inca Bean	IB IB IB IB IB IB
					Z_20958	Bastard Cardamon	CA CA CA CA CA CA

Type ID	Type	Zone Cat ID	Management Zone Category			Management and Use Zone sub-category	Color
		Z_211	Fish and shrimp ponds Zone		Z_21101	Fish And Shrimp Ponds	
					Z_21102	Fish Ponds	
					Z_21103	Shrimp Ponds	
		Z_212	Land Reserved for extending production		Z_21201	Land Reserved For Extending Production	
		Z_213	Agro-Forestry Zone		Z_21301	Agro-forestry zone - not further specified	
					Z_21302	Agro-forestry zone - Coffee under Forest	CF CF CF
					Z_21303	Agro-forestry zone - Cardamom under Forest	CA CA CA CA
					Z_21304	Agro-forestry zone - Tea under Forest	QT QT QT QT
					Z_21351	Agro-forestry Tree Planation: Rubber	RB RB RB RB
					Z_21352	Agro-forestry Tree Planation: Eaglewood (Aquilaria crassna)	AC AC AC AC
					Z_21353	Agro-forestry Tree Planation: BongBark Trees	BB BB BB BB
					Z_21354	Agro-forestry Tree Planation : Oil palm	OP OP OP OP
					Z_21355	Agro-forestry Tree Planation : Tung oil tree	TO TO TO TO
		Z_214	Livestock raising in pens/farm		Z_21401	Livestock raising in pens/farm - not further specified	
					Z_21402	Livestock raising in pens/farm: Pigs	
					Z_21403	Livestock raising in pens/farm: Chicken	
					Z_21404	Livestock raising in pens/farm: Pigs over fishpond	
					Z_21405	Livestock raising in pens/farm: Cattle	
Z_3	Water Land	Z_301	River, stream		Z_30101	River, Stream	
					Z_30102	River	
					Z_30103	Stream	
					Z_30104	Fish Conservation Reserve	
		Z_302	Lake & swamp		Z_30201	Lake & Swamp	
					Z_30202	Lake	
					Z_30203	Swamp	
					Z_30204	Sacred Swamp/Lake	SL SL SL
		Z_303	Reservoir		Z_30301	Reservoir	
		Z_304	River buffer land (ownership)		Z_30401	River Buffer Land (Ownership)	
Z_4	Building Land	Z_401	Private building land		Z_40101	Private Building Land	
		Z_402	State building land		Z_40201	State Building Land	
		Z_403	Reserve building land		Z_40301	Reserve Building Land	RL RL RL
		Z_404	Buildings in Settlement Zones		Z_40401	Buildings In Settlement Areas	
					Z_40402	School	
					Z_40403	Market	
					Z_40404	Hospital & Health Care Center	
					Z_40405	Commercial	
					Z_40406	Hotel, Guesthouse	GH GH GH
		Z_405	Rubbish Tip/Landfill		Z_40501	Rubbish Tip/Landfill	
		Z_406	Sports Fields		Z_40601	Sports Fields	

Type ID	Type	Zone Cat ID	Management Zone Category	Icon		Management and Use Zone sub-category	Color
Z_5	Industrial Land		Mining and quarry sites	Q MQ M	Z_50101	Mining And Quarry Sites	MQ MQ MQ
					Z_50102	Salt Mine	SM SM SM
					Z_50103	Stone Quarry	SQ SQ SQ
					Z_50104	Sand Quarry	SY SY SY
		Z_502	Industrial Land/Zone	Y FY F	Z_50201	Industrial Land/Zone	FY FY FY
		Z_503	Hydropower dam	HP HP	Z_50301	Hydropower	HP HP HP
		Z_504	Electricity Generating Station	G EG E	Z_50401	Electricity Generating Station	EG EG EG
				* * *	Z_50402	Solar power site	* * *
				F F F	Z_50403	Wind power site	F F F
		Z_505	Electricity Transmission/Management	EL EL E	Z_50501	Power transmission line/tower footings	TL TL TL
					Z_50502	Electricity Sub-Station	ES ES ES
		Z_506	Telecommunication Land/Zone	TZ TZ T	Z_50601	Telecommunication Land/Zone	TZ TZ TZ
					Z_50602	Telecommunication Antenna	TA TA TA
		Z_520	Land Reserved for industrial land		Z_52001	Land Reserved for industrial land	
Z_6	Roads	Z_601	Paved road		Z_60101	Paved Road	
		Z_602	Unpaved road		Z_60201	Unpaved Road	
		Z_603	Reserve for new road		Z_60301	Reserve For New Road	
		Z_604	Railway alignment		Z_60401	Railway Alignment	
		Z_605	Transportation station land		Z_60501	Transportation Station Land	
		Z_606	Source of soil/gravel for road construction		Z_60601	Source Of Soil/Gravel For Road Construction	
Z_7	Cultural land	Z_701	Temple etc (place of worship)	CR C	Z_70101	Cultural Buildings And Sites	CR C
		Z_702	Spiritual areas	SF S	Z_70201	Sacred Forest	SF S
				CF CF CF	Z_70202	Cemetery Forest	CF CF CF
		Z_703	Historic & Historic tourist sites	NI NI NI	Z_70301	Historic Or Religious Tourist Sites	
			Z_70302	Nature/Eco Tourist Sites			
Z_8	Defence, peacekeeping	Z_801	Defence and security facilities		Z_80101	Military Facility	
		Z_802	Military and police strategy land		Z_80201	Police Facility	
Z_9	Other Natural Lands	Z_901	Unvegetated Lands	90,90,90	Z_90101	Unvegetated Lands	90,90,90
				75,75,75	Z_90102	Barren Land (natural)	75,75,75
				65,65,65	Z_90103	Barren Land (human made)	65,65,65
				50,50,50	Z_90104	Rock Landscapes	50,50,50
		Z_902	Other Natural vegetation		Z_90201	Other Vegetated Land	
					Z_90202	Natural Savanna/Grassland	
	Z_90203			Natural Shrublands			

#### 4. List of Points of Interest (PoI) or auxiliary attributes

<b>3: Points of Interest Symbols</b>					
Name English	Symbol color	Symbol	Symbol size	Dataset TABI_GIS	GIS Attrib
<b>1 Current Uplandfields</b>					
Field as Point, Upland rice (year B)			18	PP_DD_KK_Village_Ray_YYYY.shp or PP_DD_KK_Kum_Ray_YYYY.shp	
Field as Point, Upland rice (year C)			18	PP_DD_KK_Village_Ray_YYYY.shp or PP_DD_KK_Kum_Ray_YYYY.shp	
Field as Point, Maize (year B)			18	PP_DD_KK_Village_Ray_YYYY.shp or PP_DD_KK_Kum_Ray_YYYY.shp	
Field as Point, Maize (year C)			18	PP_DD_KK_Village_Ray_YYYY.shp or PP_DD_KK_Kum_Ray_YYYY.shp	
Field as Point, Cassava (year B)			18	PP_DD_KK_Village_Ray_YYYY.shp or PP_DD_KK_Kum_Ray_YYYY.shp	
Field as Point, Cassava (year C)			18	PP_DD_KK_Village_Ray_YYYY.shp or PP_DD_KK_Kum_Ray_YYYY.shp	
Field as Point, Other upland crops (year B)			18	PP_DD_KK_Village_Ray_YYYY.shp or PP_DD_KK_Kum_Ray_YYYY.shp	
Field as Point, Other upland crops (year C)			18	PP_DD_KK_Village_Ray_YYYY.shp or PP_DD_KK_Kum_Ray_YYYY.shp	
<b>2 Village Locations</b>					
Village			22	Village_05032013.shp	
<b>3 Points of interest</b>					
Mountain	255,0,0		20	PP_DD_KK_Village_mnt_DDMMYY.shp or PP_DD_KK_Kum_mnt_DDMMYY.shp	1
Mountain Pass	255,0,0		30	PP_DD_KK_Village_mnt_DDMMYY.shp or PP_DD_KK_Kum_mnt_DDMMYY.shp	2
Mountain Ridge	170,0,230		20		3
Provincial Office			22	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	4
District Office			20	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	5
Village Cluster office	0,0,0		20	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	6
School	0,0,0		20	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	7
Market			20	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	8
Hospital & health care center			20	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	9
Hotel, Guesthouse			20	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	10
Water Source	0,90,230		22	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	11
Waterfall	0,90,230		25	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	12
Cave	115,40,0		30	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	13
Temple	230,150,0		20	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	14
Stupa	230,150,0		20	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	15
Bridge			22	PP_DD_KK_Village_POI_DDMMYY.shp or PP_DD_KK_Kum_POI_DDMMYY.shp	16
Culvert	255,0,0		20		17
Irrigation Weir	0,90,230		22		18
Spring	0,90,230		22		19
Khum			22	PP_DD_KK_Village_Khum&Sanam.shp	20
Sanam			22	PP_DD_KK_Village_Khum&Sanam.shp	21
Other POI	255,0,0		20		99

	Name English	Symbol color	Symbol	Symbol size	Dataset TABI_GIS	GIS Attrib
4	<b>Crops</b>					Code
	Maize with name of owner		M	20		1
	Rubber with name of owner		R	20		2
	Cardamom with name of owner		C	20		3
	Rice (Paddy) with name of owner		P	20		4
	Mungbean with name of owner		MB	20		5
	Teak with name of owner		T	20		6
	Banana with name of owner		B	20		7
	Job's tears with name of owner		J	20		8
						99
<b>Line Symbols</b>						
5	<b>Roads</b>					
	Road bigger 8m paved surface	255,127,127		1.5	roads_nov_2013.shp	
	Road bigger 8m unpaved surface	255,190,190		1.5	roads_nov_2013.shp	
	Road smaller 8m paved surface	255,127,127		1	roads_nov_2013.shp	
	Road smaller 8m unpaved surface	255,190,190		1	roads_nov_2013.shp	
	Foot Path	0,0,0		1	roads_nov_2013.shp	
	Track	0,0,0		1	roads_nov_2013.shp	
6	<b>River and stream</b>		Set "reference scale" to 1:15.000			
	Rivers	10,150,250		1.5	TABI_riv.shp	100
	Stream	10,150,250		1.2	TABI_riv.shp	200, 300
	Intermittant stream	10,150,250		1.2	TABI_riv.shp	400

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