GUIDEBOOK ON FOREST MANAGEMENT SYSTEMS FOR UDP FIELD STAFF (RMOs & MSOs) AND LGU (ATs) AND OTHERS

Final Version

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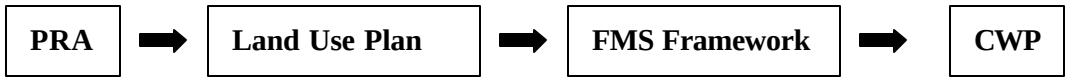
I. Rationale and Introduction

This guide was prepared in support of the need for forest management system models for the Upland Development Program (UDP). It was based on data gathered from the program offices and in several UDP communities. Preliminary information came from sitio profiles, land use plans and CWPs of 1st and 2nd barangays while subsequent dialogues with residents in selected project sites produced more detailed data. These showed that lands used for forestry consists of natural growth or plantations and cover about 30% of most UDP-assisted sitios. However, their total economic importance is not considered in planning community development and implementation.

The reason for such oversight is that most field facilitators do not know how this can be done. Hence, this guide is tailored for the use of project field staff in facilitating community evaluation of forest resources and assessment of existing forest based livelihood and needs in order to identify the appropriate management models and the corresponding treatments and rehabilitation methods. This document also briefly describes the possible forest management practices that may be applied plus a section on the potential income of selected forest species and products.

The (FMS) framework must eventually be incorporated into the CWP

The planning procedures described herein were designed to be compatible with existing processes (Land Use, Farm Planning or CWP preparation). The objective is the production of a **community forest management framework** that; depicts the existing situation in terms of resources and needs, spells out the management directions, proposed interventions and the implementation schedule. Supporting maps will consist of those generated during the land use planning process. The framework must eventually be incorporated into the CWP. The basic process by which the FMS Framework evolves is illustrated as follows:



It must be noted that it also focuses only on natural forests and plantations and does not cover situations where fruit trees are mixed with forest trees (agro-forestry) but does consider selected industrial crops like rubber and abaca. For agro-forestry cases the user is advised to refer to the systems designed by P.T. Tuazon (Agroforestry Training Manual) under the Sustainable Agricultural Development (SAD) component.

II. Definition of Forestry

Forestry is defined as a group of trees and other plants covering a large area. However, this is not always true the uplands setting. Confusion is brought about by the mix-up of the **legal** definition of a forestland with the **technical** description of a forest. The former is defined as all public land falling with slope of more than 18%, even if there are not trees or forests growing on it. Therefore, the **legal definition only applies to the land but not to what is growing on it**.

For the purpose of this manual, the technical definition of forest will be used. As such, the Program defines **forest as any group of woody and non-woody plants, regardless of area, not used for food production**. Therefore, this would include natural forests, brush that arose from land left to fallow for a long time and plantations of trees being grown for non-agricultural purposes.

III. Forest Management Principles and Approach in Upland Communities

Most of the things used in daily life, like food, clothing, shelter and medicine can be traced as coming from forests. More important, forests contribute to sustained supply of good quality water and produce much of the oxygen in the atmosphere. In fact, natural forests are viewed as life support systems.

... the practice of ensuring the most number of people obtain the greatest benefit from a tract of natural forest or plantation, on a sustainable basis.

Hence, forest management is basically the practice of ensuring the most number of people obtain the greatest benefit from a tract of natural forest or plantation, on a sustained basis. Natural forests are more complicated to manage but provide all the benefits (air, water, food, shelter, clothing, medicine, etc.). Plantations are normally established for timber, fuel or food (fruit) production but can likewise contribute to improving water yield and soil erosion control.

Although most of the remaining natural forests in Southern Mindanao are no longer being subjected to commercial utilization, products are still extracted for local consumption or to provide supplemental income. There is also a growing awareness of their role as protection against environmental catastrophes, and most of all, as an important factor for sustained water supply.

However, these circumstances are still not sufficient deterrents against the conversion of forests into farms through slash and burn agriculture (*kaingin*) or degradation through timber poaching. Nor are they adequate incentives for claimants to allow expansion of this type of vegetation, which is the most appropriate cover in the uplands. This all shows that, **in the hard living conditions of the uplands, economic needs take precedence over environmental concerns.**

Therefore, community forest management, must always start from what is expected or needed in terms of goods and services from existing natural forest and/or plantations) or areas proposed for reforestation. As such, the best approach to be followed should be to **build upon and improve what already exists.**

…forest management, must always start from what is expected or needed in terms of goods and services…

IV. Forest Management Models in UDP Areas

The consolidation of existing land use data, field observations and community consultations indicate there are **three basic models** that exist in UDP areas. These are classified according to vegetation type with each having particular uses and intended benefits or products (see Table 1).

Table 1. FMS Models, Objectives and Benefits

Model type/Existing Vegetation	Management Objective/Use	Main intended Benefit/Product
Natural forest	Waterway embankment, steep slopes and water sources (springs) protection	Water and non-timber products
	Production	Water, timber and non-timber products (rattan, herbal medicine, wildlife for meat and sale, honey)
Brush or fallow	Shading for agricultural crops (i.e. coffee) Waterway embankment and water sources (springs) protection	Increased crop production, soil conservation Water and non-timber products (rattan, wildlife for meat and collection, herbal medicine)
	Slope stabilization/erosion control	Water, soil erosion control, fuel, slope stablilization and non-timber products

Forest species plantations (trees, bamboo)	Production	Construction material, fuel, industrial product (rubber)
	Shading for agricultural crops (i.e. coffee)	Increased crop production, soil conservation
	Slope stabilization/erosion control	Construction material and fuel
	Roadside embankment stabilization	Erosion control/soil conservation
	Individual farms boundary delineation	Construction material and fuel

V. Procedures/Steps in Forest Management Planning (Framework Preparation)

The wide range of goods and benefits provided by forests are not limitless. These areas also have competition from other land uses, primarily agriculture and settlements. Such conflicts should have been resolved during the land use planning sessions before the task of forest management begins.

The forest consists of living organisms that reproduce and grow. As such, it is a renewable resource. Therefore, the basic rule in sustainable forest management is not to utilize/extract faster than the regeneration rate.

Once forestry areas have been allocated, their careful management is needed. This starts with proper planning on how the community resources can be balanced against present and future needs. The following sections describe how this can be done in a participatory manner with the community.

Although some of the steps may seem too technical for community members, it is important they be involved, in a way or another, so that their sense of ownership over the outcome is maintained. Additionally, they will learn from the process and thereby increase their empowerment. In the end, it is their resources and well being they are planning for. Most important, before proceeding on any of the planning activities, it is necessary to orient the community members on why and what will be done.

1. How to Conduct Forest Resources Evaluation

This phase involves finding out what is the content of the forest areas within a community. The basic activities are:

- preparatory work to establish the extent of the forested areas
- organizing and orienting the community on the method and procedures involved
- conducting the evaluation
- and consolidating information gathered.

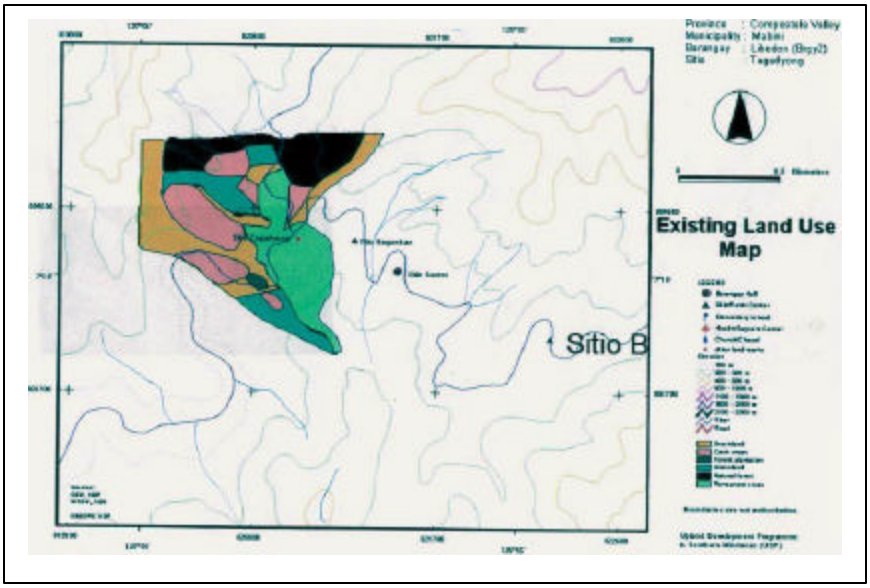
1.1 Preparatory Steps

There is a need to first organize the group that will undertake the evaluation activities and clearly establish the extent of the forested areas that will be evaluated as henceforth described:

a) Form the evaluation team from among the members of the community Technical Working Committee on Resource Management. These should be able bodied, skilled in identifying trees and other plants and also able to read, write and execute basic arithmetic operations. They must also be willing and able to carry out extensive computation of data gathered in the field.

b) Together with the selected community members, validate the existing cluster land use/land cover map produced during land use planning sessions and make the appropriate corrections, if needed.

Figure 1: Land Use Map



c) Using the method described in the Land Use Planning Manual (Activity/workshop 7), extract the area of natural forests and plantations. Assign an index or identifying code for each block and tabulate accordingly.

Table 2. Consolidated Land Use Information

UDP-FMS Form No. 1
Consolidated Land Use Information Sheet

Page __ of ___

Sito:_____, Barangay: _____, Municipality: _____
Province: _____

Index No./ Code	Existing			Proposed per LUP						
	Vegetation/ species type	Use	Area (ha)	Use	Area/year (ha)					
					1	2	3	4	5	Total
NF01	Natural forest	Protection	50	Protection	45	45	45	45	45	45
				Production	1	1	1	1	1	5
BL01	Brushland	Protection	20	Protection	20	20	20	20	20	20
				Production	1	1	1	1	1	5
FP01	Forest plantation	Production	100	Production	18	18	18	18	18	90
				Protection	5	5	5	5	5	25
Total			170		91	92	93	94	95	190

d) Conduct an orientation for community leaders on the forest management planning process, the three resource evaluation methods (see following section) and what these involve in terms of human, financial and material inputs. Engage the services of a resource person from DENR, the academe or civil society (NGO), if needed.

e) Given such information and knowing the extent of the forested areas, the leaders can decide on what method to employ, how many and who will be involved. This

would also be a good opportunity for the community to make a self assessment on their forest management capability in terms of existing skills.

f) Prepare a schedule for coaching or tutoring of each team during the conduct of the evaluation. A sample lecture outline for such training is found in Annex 1.

1.2 Evaluation Methods and Procedures

Depending on available time and resources, evaluation could be done by simply **interviewing** key community informants, conducting a **complete inventory** or by **sampling** of the resource. The purpose of evaluation is to determine what is the content of the resource and determine what treatments need to be done.

A. Steps in Conducting Simple Interviews

a) Where the forested areas are very large, time is limited and it is deemed to expensive and difficult to evaluate through inventories and sampling methods, conducting interviews is the most practical method to adopt. It is important to select informants that are very familiar with the area in question. This is because most upland communities are located far from each other. Hence, persons living in a different place will be familiar only with conditions in their surroundings. It is also best they are those directly benefiting from the resource, like rattan and firewood gatherers, hunters and timber harvesters.

b) Depending on time available interviews can be conducted with each informant or through a focus group discussion. The form in *Annex 1* can be used as an interview instrument where individual interviews are conducted. The information generated can also be used in assessing the current use and needs, which is described in Section 2 (How to Conduct Current Use and Needs Assessment).

c) Information on the content of the forests gathered during individual interviews or focus group discussions will be indicative rather than quantitative and can be tabulated in the format below. The line of questioning can proceed from asking whether a land use plan was prepared and what are the forest types identified as existing in the area. Once forest types are known, it can be determined why and how these are being managed, if ever. What are the uses and goods derived.

Table 3. Summary of Interview on Forest Resources

UDP-FMS Form No. 2
Summary of Forest Resources Data from Interviews

Page __ of ___

Sito:_____, Barangay: _____, Municipality: _____
Province: _____

Index No./ Code	Vegetation/ species type	Products		
		Identity/ type	Frequency and quantity gathered	Estimated productive life (years)
NF01	Natural forest	Rattan	10 poles/week	2
BL01	Brushland	Fuel	2 “talaksan”/week	5
FP01	Forest plantation	Lumber	2500 board feet/month	10

Notes: The index number or code refers to the area being evaluated as derived from the existing land use map. Vegetation or species type can either be natural forest, plantation or brushland. Products can be timber (logs, flitches or “tablon”, lumber, shingles, firewood, etc.) or non-timber (bamboo, palms, rattan, fruit, resin or sap, bark, vines, wildlife, honey, etc.). Information on frequency and quantity of products being gathered shall come from the key informants. In selecting these persons, Such data is a rough indication of the productive capacity of the block. This should be expressed in how much is harvested per given time period (i.e. kilos/week, board feet/day, or poles/week).

d) Depending on how well they know the resource, the key informants may be able to estimate how many more years the block can sustain such production. However, such kind of data needs to be validated against available scientifically gathered yield information. This can be sourced from the DENR-Environmental Research & Development Bureau (ERDB). If such office is not accessible, the assistance of a resource person should be tapped.

B. Steps in Conducting a Complete Resource Inventory

Whenever areas to be evaluated are small and there is sufficient time, human and/or financial resources, it is best to conduct a complete inventory. With such method, information to be recorded will be more quantitative and it would be easy to determine how much of each product is contained in each block.

An inventory team will have to be organized in each sitio to carry out the fieldwork. This normally consists of one recorder and two or more markers. Normally, in moderate terrain and where undergrowth is not thick, a basic team of three can finish up to three (3) hectares per day in plantations and two (2) of natural forests. The accomplishment rate in natural forests is less because these consist of more diverse vegetation.

.. a basic (inventory) team of three can finish up to three (3) hectares per day in plantation and two (2) of natural forests

Considering that the community evaluation team members cannot be kept away from their normal livelihood activities for long, it is recommended that inventory activities be limited to **no more than three days continuous work**.

Each team will have to be equipped with recording forms, writing instruments, clipboards, plastic folders to keep paper dry, about 25 meters of nylon string graduated at 1-meter intervals and if available, a simple box compass.

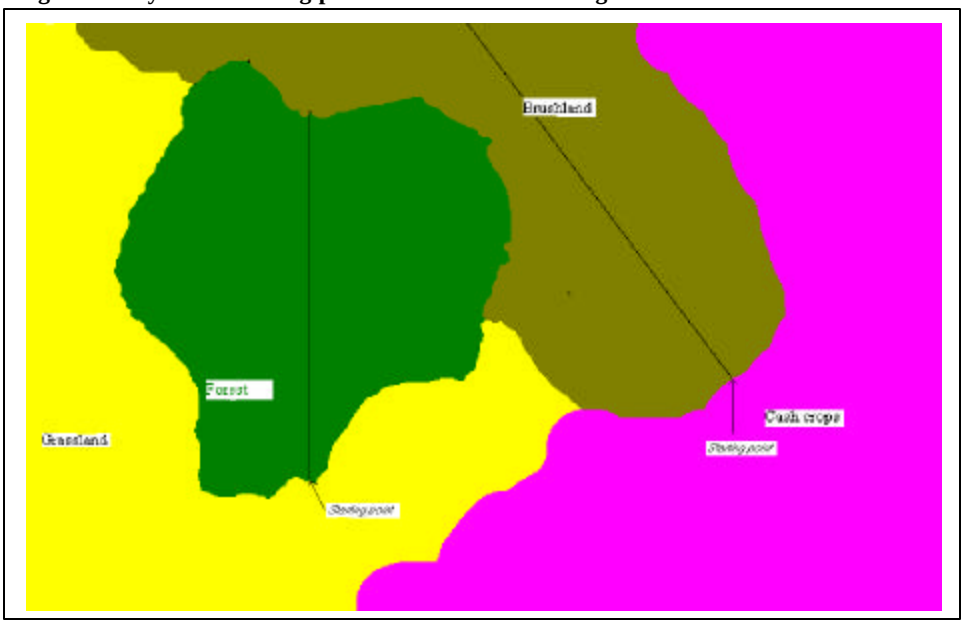
Simplified procedures in carrying out a complete forest resource inventory is as follows:

a) Using the corrected land cover map, Index (ex. natural forest block 1 = NF01) each block of forest or plantation according to the sequence of which they will be inventoried.
b) On the same map, decide on a starting point at the edge each block and stretch a line thereon to the opposite side. The point must be identifiable on the ground. If the block is less than two (2) hectares, the team can proceed from thereon with inventory.

For larger areas, the line formed can serve to divide the block into equal sections (Figure 2). It is important the line cut across different vegetation density of the area. In such case the line direction must be noted in the map and followed on the ground.

c) At the field, locate the starting point of a line and proceed in laying it on the ground according to the direction noted on the map.
d) Start the inventory in one quadrant and proceed in either a clockwise or counterclockwise direction. The markers estimate the height and diameter of each plant. They call this data out to the recorder who makes the corresponding entry in the inventory form.

Figure 2: Layout of starting points and block sectioning



e) The design of inventory forms depends on the data desired. This can consist of simply a count of plants to be harvested or include measuring dimensions for eventual volume computation.

f) For timber, a simple method of determining the content of existing stands is to simply **count the number of harvestable sized** trees. For natural forests, government regulations set the minimum size of a tree that can be cut at 60 centimeters diameter. A simple way to gauge this is to use hand spans ("dangaw") which in this case, is equal to three (average hand span = 20 centimeters).

> ***A simple way to measure diameter is to use hand spans ("dangaw") which is equal to about 20 centimeters***

g) There are no official cutting limitations for plantation species, as this depends on the specifications set by the buyer or requirements of the user. In such case, simply count the number of trees of the required size(s). The limits are usually in terms of diameter and it is important to note that the commercial market uses top or base. When the intended product is poles for power lines, the top is set as the limit. If timber, it is usually the base.

h) Since, evaluating the resource is also to determine how much there will be in the future, immature trees and other plants will also have to be counted. Mature trees are usually classified according to use. Which is sawlog or pole. Those of pole size can be utilized as such for electric power lines. If left uncut, these would normally grow into sawlog size within 10 – 15 years.

i) Market specifications of harvestable non-timber species like bamboo and rattan are also set according to diameter and a minimum length. For others like palms and vines, it usually the species and age that determines utilization or marketability. Therefore, simply count and record individuals that satisfy the requirements. It is important that **each individual counted should be marked** with paint or some other material. This is **to avoid double counting**. The form that can be used for such simple inventory can be as follows:

Table 4. Record Sheet for Simple Count Inventory

UDP-FMS Form No. 3
Forest Resource Inventory Record Sheet
(Simple Count Method)

Page __ of ___

Sito:_____, Barangay: _____, Municipality: _____
Province: _____ Date: _____ Recorded by: _____

Block/ Index No.	Species	Unit	Quantity	Remarks
NF01	Red Lauan	Stem	3	Sawlog size
	Treefern	Stem	3	
	Bagtikan	Stem	15	Pole size
	Rattan	Culms	5	
	Orchid	Plant	3	Waling-waling
	Bamboo	clump	2	
	almaciga	stem	4	resin
	Balobo	Stem	1	Sawlog size
BL01	Palms (bahi)	Stem	4	
	Beehive		2	"putsukan"
	Rattan	Culms	2	
	White lauan	Stem	1	pole

Notes: Units of measure are stems for trees, palms (erect or rattan). Clumps for bamboos. Remarks can describe size and certain characteristics of the individual being evaluated (i.e. crooked stem).

j) Where detailed and measurable information is desired, particularly the volume of logs (expressed in cubic meters) or lengths of non-timber products (rattan, vines), the inventory team will have to take measurements in the field. The form to be used in such case can be as shown in Table 5.

Table 5. Record Sheet for Detailed Inventory

UDP-FMS Form No. 4
Detailed Forest Resource Inventory Record Sheet

Page __ of ___

SITO:_____, BARANGAY: _____, MUNICIPALITY: _____

Province: _____ Date: _____ Recorded by: _____

Block/ Index No.	Item No.	Species	Dimensions		Volume (cu.m.)	Remarks
			Length (m.)	Diameter (cm.)		
NF01	1	Red Lauan	15	60	2.75	Sawlog
	2	Rattan	20	0	0	
	3	Bamboo	30	0	0	
	4	Bamboo	20	0	0	
	5	Treefern	2	0	0	
	6	Bagtikan	15	40	1.22	Pole
	7	Almaciga	20	90	0	Resin = 3 kilos/year
	8	Balobo	10	70	2.43	Sawlog
BL01	1	White Lauan	12	40	0.98	pole
				T o t a l	7.38	

k) Once field recording in more detailed timber inventories is done, there is normally the need to determine volumes. The reference in doing this for standing timber is called a volume table (*Annex 2*). This gives the amount of volume per diameter category and length. However, upland residents are more familiar with board feet as a unit of measure. A solid cubic meter of wood contains 424 board feet of lumber. Hence, once converted to lumber with a chainsaw, up to 50% may be lost as sawdust or unusable pieces (trimmings). Therefore, one cubic meter round timber may end up with a net of only 200-250 board feet lumber. There is, at most, 40% waste if the wood is processed in a band sawmill. For this purpose, the above table can be modified to accommodate the additional information, as follows:

A solid cubic meter of wood contains 424 board feet of lumber

Table 6. Summary Sheet of Timber Recovery

UDP-FMS Form No. 5
Timber Recovery Summary Sheet

Page __ of ___

Sito: _____, Barangay: _____, Municipality: _____
Province: _____ Date: _____ Prepared by: _____

Item No.	Species	Dimensions		Volume			Remarks
		Length (m)	Diameter (cm.)	Solid	Less % waste	Net lumber (BF)	
1	Red Lauan	15	60	2.75	50	583	Chainsaw cut
2	Balobo	10	70	2.43	50	515	
			Total	5.18		1,098	

l) Because they move around, recording wildlife is both difficult and unreliable. The record can simply indicate what kind, in what vegetation these were observed (grassland, natural forest, brush, fallow, plantation or agricultural), whether mature or immature, estimated number and frequency of occurrence. Record these last three items in the remarks column of Tables 4 and 5.

m) Whenever springs are noted simply record these under the remarks column. In the case of creeks make sure to note whether it is intermittent or constantly flowing.

n) When all the blocks have been inventoried, consolidate all the data and sum up the quantities of all the various forest products and benefits using the format below. This will be a very wide table if there are many goods and services noted. It may be necessary to prepare two or more such tables. One for timber another for non-timber plants and maybe another for wildlife and others.

Table 7. Consolidated Results of Forest Resource Inventory

UDP-FMS Form No. 6
Consolidated Summary of Forest Resource Inventory

Page __ of ___

Sito:_____, Barangay: _____, Municipality: _____
Province: _____ Date: _____ Prepared by: _____

Block No./ Index	Quantity of Product						
	Timber		Fuel		Rattan		Others
	Count	Volume (BF)	Count	Volume (talaksan)	Count	Length (m)	
NF01	35	5,000	100	90	40	50	
BL01			30	20	15	26	
Total	35	5,000	130	110	55	76	

C. Conducting Resource Sampling

Sampling is done through a complete inventory inside plots or strips established within each block. This method is appropriate under the following conditions:

- Areas to be evaluated are large (more than 10 hectares);
- Time is limited;
- Available material, financial and human resources are in short supply.

It is a more complicated method since it involves some computation of figures. It is also the only method that can be used for determining water volume production from a particular area.

a) **Sampling the Vegetation**

i. Normally, a sampling intensity is set which determines the size of each plot. DENR standards place this at 5 – 10 %. However, for purposes of simplicity plots can simply be 10m X 10m squares or a 10-20 meter wide transect across the subject area. The line bisecting a block as described earlier and illustrated in Figure 2, serves as the transect baseline.

Figure 3: Location of sampling plot (white squares) relative to vegetation density & slope

ii. Inspect the block to be sampled and note the density and structure of the vegetation. Locate the sample plot(s) where these characteristics are best covered. This very important to avoid bias and consequent large variances in the data (Figure 5).

iii. The methods of recording in sampling are the same as that for inventories. However, the data will only indicate the quantities within the sample plot. To get that for the whole block first divide the quantity sample over the area of the plot then multiply by the total area.

Example 1: Number of trees

Plot size = 10m x 10m. = 100 square meters or 0.01 hectares
Block size = 10 hectares
Number of trees counted w/in plot = 2
Number of trees per hectare = 2/0.01 = 200 trees
Total number of trees w/in the block = 200/hectare x 10 hectares = 2,000

Example 2: Volumes

Plot size = 10m x 10m. = 100 square meters or 0.01 hectares
Block size = 10 hectares
Number of trees counted w/in plot = 2
Equivalent volume (cubic meters) per volume table = 3
Number of volume per hectare = 3/0.01 = 300 cubic meters
Equivalent in board feet (BF) = 300 cu.m. x 424 BF/cu.m. = 127,200 BF
Equivalent BF as converted to lumber with chainsaw (50% waster) = 63,600 BF
Volume BF lumber for whole block = 63,600 x 10 hectares = 636,000 BF

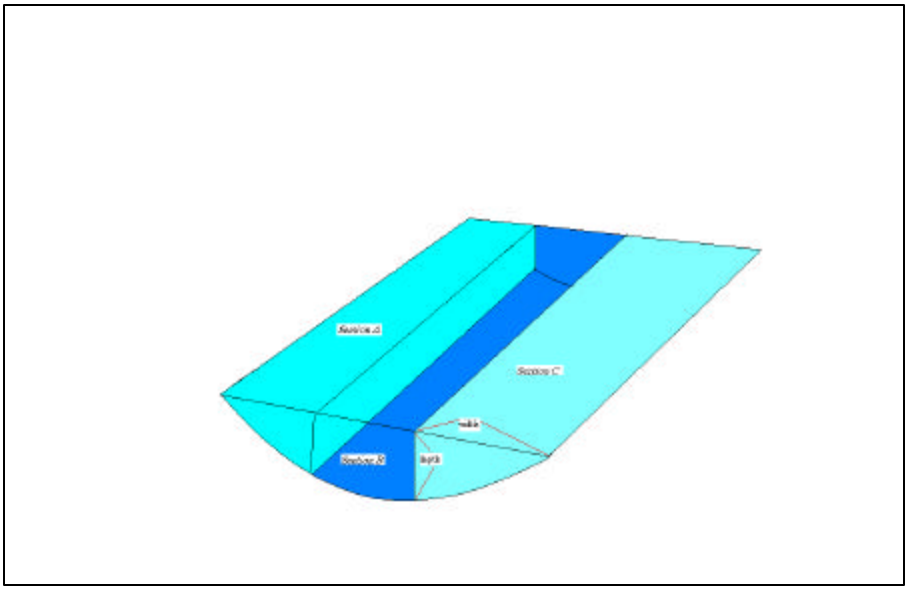
b) **Sampling the Water Resources**

Determining the production rate of identified domestic water sources (springs) is best done during long dry periods when the flow is weakest. Do this by timing (if there is no watch count in thousands i.e. 1,001, 1,002, 1,003….etc.) how long it takes to fill a container of a known capacity then extrapolate over a 24-hour period (ex. 13 seconds/20 liter can. = 1.5 ltrs./sec Soln.: 1.5 ltrs. X 120 seconds/hr. x 24 hrs. x 365 days = 1,576,800 ltrs/yr ÷ 1,000 ltrs.cu.m. = 1,576.8 cu.m./year). Engineers with the Agricultural Infrastructure Support (AIS) component can show how to conduct this measurement.Measuring the average flow from a steam (surface source) is best done in two occasions - during dry and wet periods.

Figure 4: Layout of section of stream

i. The procedure involves laying out a fixed length section along the stream. This is called a weir (Figure 4). The cross section of a stream shows it not to be a regular shape (Figure 5). Normally, it is in the form of an inverted hemisphere. Therefore, it is necessary to break it down into three sections forming two triangles (Section A& C) on each side and a square or rectangle (Section B) in the middle. Take the dimension then compute the volume of each.

Figure 5. Graphic illustration of weir dimensions.



ii. The volume of streamflow per unit time can be determined by timing how long it takes a floating object (piece of wood or leaf) to travel from the upstream end to downsteam. Do this at least three times and get the average. It is also best to get the one set of readings for the dry and wet seasons.

Example:

1) Given: depth A = 0.40 m, width = 1.5 m, length = 2 m.
   Depth C = 0.35 m., width = 1.75, length = 2 m.
   Depth B = 0.5 m., width = 1m, length = 2 m
2) Total volume = volumes of Sections A+B+C
3) Volume of section A = ½depth (m) x width (m) x length (m)
   = ½0.4m x 1.5m x 2 m.
   = 0.6 cu.m.
4) Volume of section C = ½depth (m) x width (m) x length (m)
   = ½0.35m x 1.75m x 2 m.
   = 0.6125 cu.m.
5) Volume of Section B = depth x width x lengt h
   = 0.5 m. x 1 m. x 2 m.
   = 1 cu.m.
6) Total Volume = 0.6 + .6125 + 1
   = **2.212 cu.m.**
7) Time floating object traversed length = 17 seconds.
8) Volume/day = 2.215 cu.m. ÷ 17 seconds
   = .13 cu.m./sec x 86,400 seconds/24 hours
   = ***11,232 cu.m./day or 4,099,680 cu.m./year***

2. How to Conduct Current Use and Needs Assessment

The previous section described the procedures on determining how much there is of forest products. The following deals with what has to be done to determine the **demand** for goods and benefits from the forest and how these should be prioritized.

2.1. Determining the Demand for Goods and Services

a) Conduct focus group discussions in each sitio to identify what are the current goods and services being extracted or provided by, or are related to, the forest. Questions should be directly related to everyday life requirements (ex. Where do you get materials for house construction? What are these? Do you hunt and where? Aside from wood and meat, what other daily needs do you get from the forest?). Such information like a forest being preserved as it is believed to protect a water source, can be determined in the land use plan.

b) Tabulate in the following manner:

Table 8. List of Forest Goods and Services

UDP-FMS Form No. 8
FGD Listing of Forest Goods and Services

Page __ of ___

Sito:_____, Barangay: _____, Municipality: _____
Province: _____ Date: _____ Recorded by: _____

Vegetation type	Goods	Services
Natural forest	lumber, rattan	Water
Brush	Water	Erosion control
Plantation	Lumber, fuel	Erosion control

2.2. Determining the Needs

Have the community identify and prioritize their forest-related needs through focus group discussions or other group facilitation methods. Quantify these whenever possible and determine how large a forest resource-base is needed using the following guides methods:

a) **Domestic water supply**

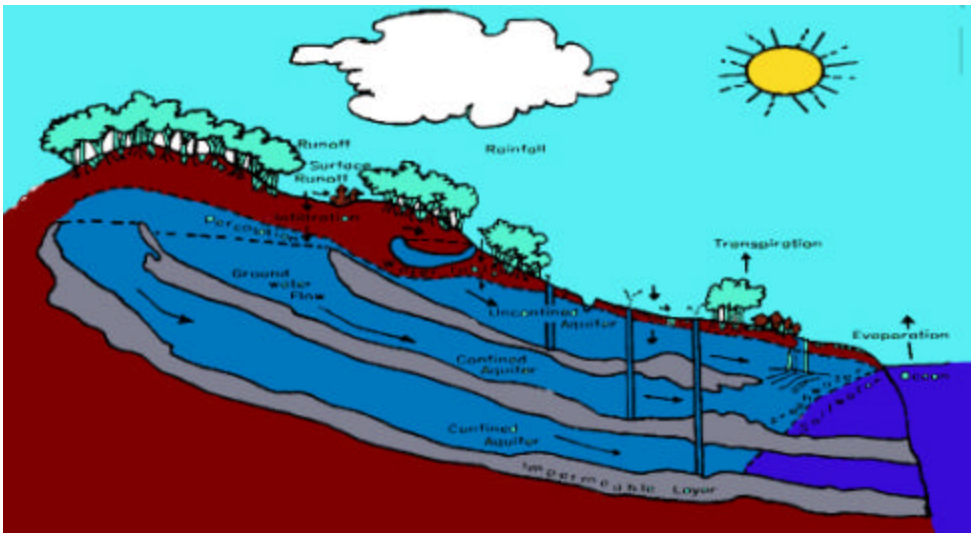
The common domestic water sources in upland communities are springs. Since these flow from under the ground it is not easy to determine their point of origin, which is called a **recharge area** (see Figure 8). Land at this location should ideally be covered with thick vegetation to assure the maximum amount of rainfall is absorbed into the ground thereby ensuring a steady water flow at the spring outlet. Otherwise, much of the water would be lost to run-off.

Therefore, contrary to common perception, maintaining a forest cover at the spring outlet itself does not assure its continues flow. Nevertheless, it can safely be presumed the land above comprises its recharge area.

…contrary to common perception, maintaining a forest cover at the spring outlet itself does not assure its continuos flow.

Therefore, where the supply from the present source is insufficient, the community can opt for either improving its productivity or tap additional ones. Where the first option is taken, the initial action is to determine whether the land above the source, and within its catchment (micro-watershed), is either denuded or covered by very thin vegetation. Where such are the conditions, the logical solution would be to replant with trees.

Figure 6: Cross section of watershed (recharge area is portions above the wells and springs)



When planning future water supply, first determine the total current daily household consumption (in liters) and then multiply this by the projected number of households for the planning timeframe.

Example:

Present number of households	=	52HH
Average consumption/household(liters)	=	80 liters
Current demand	=	80 x 52
	=	4,160 liters
Projected annual growth rate	=	3%
Planning period	=	5 years
Projected (planning period)	=	52*(3/100 x 5)
	=	7.8HH or 8HH + 52
	=	60HH
Project daily demand after 5 year	=	60 x 80
	=	4,800 liters or

Using resource evaluation and above computations, prepare the following planning matrix to determine excess or deficit. Figures used in the table come from preceding examples.

Table 9. Domestic Water Supply and Demand Matrix

Planning Factors	Year				
	1	2	3	4	5
Existing Supply (cu.m./yr)	1,576.8	1,576.8	1,576.8	1,576.8	1,576.8
Current Demand (cu.m./yr)	1,518.4	1,563.9	1,610.8	1,659.1	1,708.9
Excess (Deficit) in cu.m.	58.4	12.9	(34.0)	(82.3)	(132.1)

In the above matrix, the supply would no longer be enough starting on the third planning year. Given such knowledge, the community can immediately start identifying additional sources.

b) **Irrigation**

The farmers themselves can establish whether the present supply is sufficient or not based on what they irrigate. It is advisable they seeks the assistance of an agricultural engineer is needed to gauge the quantity of water needed since this is affected by many factors. However, in the absence of any, their stock knowledge may suffice. The process of assessing the supply and demand situation for irrigation is the same as that for that of domestic water.

Assuming the community has about five (15) hectares of irrigated rice that they cultivate for two cropping seasons and about 30 hectares of fruit orchards that are to be irrigated during three months of dry period, the computation will be as follows:

Example:

i. Water requirement for 15 hectares rice = 500 cu.m./ha/season x 15 ha. X 2 seasons
= 15,000 cu.m./year

ii. Water requirement of 20 hectares orchard
= 30 ha. X 625 trees/ha x 5 ltrs/tree/day
= 93,750 ltrs/day x 90 days/year
= 8,437,500 ltrs or 8,437.5 cu.m./year

iii. Annual increase in orchard demand = 20%

iv. Total current annual requirement = 8,437.5 + 15,000 cu.m.
= 23,437.5 cu.m./year

Table 10. Irrigation Water Supply and Demand Matrix

	Year				
Planning Factors	1	2	3	4	5
Existing Supply (cu.m./yr)	4,099,680	4,099,680	4,099,680	4,099,680	4,099,680
Current Demand (cu.m./yr)	23,437.5	25,125	27,150	29,580	30,187.5
Excess (Deficit) in cu.m.	4,076,242.5	4,074,555	4,072,530	40,070,100	4,069,492.5

c) **Shelter**

Natural forests containing harvestable trees within lands classified as production areas in land use planning can also be tapped for timber, if so desired by the community. However, these are regulated by DENR if located within public land and need to be subjected to a thorough assessment of their content before any harvesting can be done. Furthermore, harvesting need to follow procedures defined by pertinent DENR policies.

The planning factors to consider in shelter needs are for construction (private), repair, furniture fabrication, local infrastructure and others such as tools. The following example for comparing supply with demand does not consider growth of the timber stock, for purposes of simplicity. It also assumes the community is involved in commercial woodworking venture.

Example:

i. Number of HH = 55/units
ii. Annual increase = 3% or 2 houses/year
iii. House construction = 2,000 BF/unit
iv. Commercial woodworking = 5,000 BF/yr. increasing at 5%/year
v. House repairs, etc. = 250 BF/unit increasing at 3%/year

Table 11. Shelter (Timber) Supply and Demand Matrix

	Year				
Planning Factors	1	2	3	4	5
Number of houses	55	57	59	61	63
Standing stock (BF)	636,000	610,250	586,837.5	559,737.5	534,924.5
Current Demand (BF)					
Construction	4,000	4,000	4,000	4,000	4,000
Woodworking	5,000	5,250	5,512.5	5,788.1	6,077.5
Repairs, etc.	13,750	14,162.5	14,587.4	15,025	15,475.7
Infrastructure	3,000		3,000		3,000
Total	25,750	23,412.5	27,100	24,813	28,553.2
Excess (Deficit) in BF	610,250	586,837.5	559,737.5	534,924.5	506,371.3

The average annual demand in the above example is 25,926 BF. Given this rate the present standing stock is expected to last about 25 years. With such information, the community can decide on what options to take in addressing the future problem of supply.

d) **Fuel**

Fuelwood requirements can be satisfied by harvests in established plantations or timber removed from natural forests during treatments made to improve the stand quality (see succeeding sections on Forest Management Practices). For this matter, determining fuelwood consumption in order to estimate the how much area to plant may not be necessary. However, if need be, determining fuelwood demand can be done through simple interviews. The usual measure of firewood is a "talaksan" which is one cubic meter stacked volume. It is also necessary to determine the consumption per a given period of time. Given such information, it would be possible to analyze the supply and demand situation using the same procedure as that for timber.

e) **Meat from Wildlife**

Terrestrial and aquatic animals have been a traditional source of meat for upland communities. Interviews of hunters are most likely to produce the best information on how much of this resource is being tapped by the community.

f) **Non-timber**

This may be non-timber products like rattan, honey, ornamental plants, exudates like resin and latex (rubber), or herbal medicine. In contrast to timber extraction, the harvesting of such products can usually be done without a need for designating a zone within which it can be carried out. However, it is important the community set limits on the quantities to be removed in order to assure sustainable production. Such policies and regulations have to be worked out in detail by the community.

g) **Erosion Control**

The problems maps generated during land use planning will identify the location and extent of areas threatened by erosion. If not intended for cultivation, the best option open for these areas that they be left to fallow as natural regeneration results in denser vegetative cover which is most effective against erosion.

2.3. Data Consolidation

a) The preceding section describes how to compute the difference between supply and demand. Once this is done, it would be easy to determine how what has to be done in terms of interventions or development projects. This is described in the succeeding section. If for example there is a shortfall of water for irrigation then apply the sample computation in Section V.1.2 to determine how many hectares may be reforested in order to increase water production from the watershed. In the case of timber for shelter or fuel needs, the formulas for determining how many hectares to plant is detailed in Activity/workshop 7 of the Land Use Planning Manual.

b) Consolidate analysis results, identification of interventions into a Forest Management Framework that spelled out in the following format:

1) Existing Situation
   - Physical (land cover)
   - Economic (supply/demand condition)
   - Institutional (organizational capability)

2) Basic objectives
   - targets in closing supply to demand related differences
   - areas and location of intervention (natural and plantation)
   - solutions to problems and issues

3) Implementing Structure and Schedule

The whole document should not be more than three pages excluding maps (existing and proposed forest areas).

c) Incorporate into the sito plan and CWP.

VI. Forest Management Practices

This section generally describes the methods of managing both natural forest and plantation for either production of protection purposes.

1. Determining Extent of Intervention

1.1 Domestic Water Supply

a) Using themes prepared during land use planning, overlay that showing existing sources (springs) over the one of projected settlements.

b) On the basis of proximity to future settlement areas, flow rates and results of supply and demand analysis (Table 9), it would be easy to determine which can be tapped for future use.

c) Using the base map, delineate the micro-watershed wherein the identified sources (springs) are located.

d) With the corrected vegetative cover map in hand, go to each of the micro-watershed together with community planners. As clearly and accurately possible, draw the permanent type of land cover on the base map. Determine the area for each, using the grid method used in land use planning then record accordingly.

e) After determining which source will serve future needs, look at the condition of the permanent vegetation (closed or open canopy) and how large an area needs to be, and can be, reforested (grass).

1.2 Irrigation

As with domestic water supply, forests are the ideal vegetation for an identified watershed recharge area. A simple but rough way of determining how much of the watershed needs to be improved (reforested or increase vegetation density) is to get the percentage of the area not yet irrigated over the total and use this as a blow-up factor on the watershed.

Example:

1) Watershed area: 1,000 hectares
2) Vegetated area in watershed: 600 hectares
3) Total irrigable area: 100 hectares
4) Actual irrigated: 80 hectares
5) Blow up factor: (100 –80) ÷100 = 20% or 1.2.
6) Vegetated area needed in watershed: 600 x 1.2 = 720 hectares
7) Number of hectares to reforest : 720 – 600 = 120 hectares

1.3 Shelter

The process of determining how many hectares of plantation to establish in order to satisfy future construction material demand is contained in the section describing Activity/workshop 7 of the Upland Land Use Planning Guide.

1.4 Fuelwood

If community residents feel the need to establish a fuelwood plantation, a simple guide to determining how large a areas is needed is that **one sapling-sized tree (about 10 centimeters diameter) contains enough wood to make three (3) regular sized bundles of firewood.** Given this data and the average daily consumption in terms of firewood bundles the community can estimate the number of trees that have to be planted. Tree planting for fuelwood does not have to be in specific blocks. Community members can plant along the boundaries of their claims, homelots, backyards and any area not intended for cultivation.

1.5 Wildlife

Managing this resource on a sustainable basis requires the preservation of their habitat. Hence, these areas have to be identified and segregated as part of protected zones allocated during land use planning. Determining the extent is too complicated a process for communities since it srongly conflicts with other land uses.

There is no established method of determining how much habitat is needed since there are so many animals with varied characteristics. In such case, the planners will simply have to make the delineation on the basis of their "gut" feeling. What is important is to establish the practices by which protection of these habitats is ensured. This would include setting limits like how many animals can be hunted or quantities of fish harvested in a given time. A good policy is to prohibit extracting for commercial purposes but that only the community should enjoy such benefits.

1.6 Erosion Control

The location and extent of areas needing erosion control is determined during the land use planning sessions. The ideal vegetation for such areas is either thick grass or a dense, multi-story brush or natural forest. Plantations are not suitable if the main crop suppresses the growth of ground vegetation (cover) such as bushes, vines, etc.

2. Treatments in Areas with Existing Permanent Vegetation (Natural Forests and Plantations)

Treatments are interventions carried out on existing forests or plantations aimed at achieving a desired vegetative condition. If the purpose of a particular area is purely as a **preserve**, then the only intervention needed is to **protect**. When the purpose is primarily for **production** of goods (timber and non-timber), then there is a need to undertake treatments to **improve the quality of the main crop** (trees or otherwise).

Table 10. Matrix of FMS Model, Objective and Appropriate Treatments

Model type/Existing Vegetation	Purpose	Treatment
Natural forest	Waterway embankment, steep slopes and water sources (springs) protection	Protection
	Production	TSI & protection
	Shading for agricultural crops (i.e. coffee)	Protection
Brush or fallow	Waterway embankment and water sources (springs) protection	Protection
	Slope stabilization/erosion control	ANR, TSI, protection
Forest species plantations (trees, bamboo)	Production	Conventional plantation maintenance (Weeding, thinning & prunning)
	Shading for agricultural crops (i.e. coffee)	Protection
	Slope stabilization/erosion control	ANR & protection
	Roadside embankment stabilization	ANR & protection
	Individual farms boundary delineation	Tree planting & maintenance

2.2. Natural Forests and Brushland

a) Timber Stand Improvement (TSI) of Production Natural Forest

In natural forests intended for timber production the usual practice is to conduct **Timber Stand Improvement** (TSI). The object of such treatment is to produce a stand of timber for future harvests that has high volume of well-formed trees. It has also been proven that this type of treatment increases the timber yield by at least 50%.

Major Steps

i. The first step in TSI is the conduct of an inventory and marking of all the preferred or **Potential Crop Trees** (PCT). These are the trees which will be left to grow into high quality timber for future harvest and are normally characterized by the following:
   - Belong to dominant or co-dominant crown class (trees whose crowns form the first two upper layers of the forest canopy).
   - straight bole (stem)
   - branches are small and as horizontal to the stem as possible
   - the crown is small and located beyond the upper 1/4th of the tree height

   Competing trees or unwanted trees (those of lesser commercial value, with poor form and competing with the PCT for space) are also be marked for cutting in the course of identifying PCT's.

ii. The succeeding activity will be the treatment itself, which must be undertaken only by properly trained persons. This involves removal of unwanted trees either by girdling or felling. Other vegetation like vines that compete or hinder the grown of PCT's will have to be cut. In some cases unwanted trees can be disposed as fuelwood, or as other minor timber product, thereby recovering part, if not all, the treatment costs.

iii. Conduct periodic monitoring of growth (diameter and height) over several years to assess effect of the treatment. This is needed to determine if and when succeeding treatments are needed and most of all, predicting volume and harvesting schedule.

Figure 7. Natural Forest before TSI treatment (Trees to be removed are marked with X)

Figure 8. After TSI Treatment (Removal of undesirable trees and cutting of vines)

b) Enrichment Planting on Production Natural Forest

Where the vegetative cover of a forest has degraded to an "open canopy" condition due to excessive tree harvesting, such as in heavily logged areas, it would be necessary to plant preferred species in order to **enrich** it. In such case, there would likewise be a need to first assess the stand condition before deciding on the appropriate treatment to be undertaken. This can be done through any of the evaluation methods described earlier.

The objective of enrichment planting is either economic or environmental. Where the area was identified during land use planning as for production, then enrichment will have to be with commercial species. Species to be planted could either be forestry or fruit trees. For protection areas, the objective would simply be to increase the density and diversity.

Figure 9: Open canopy forest (in background)

c) Treatments in Protection Natural Forest

If the area was allocated for protection, then it can simply be protected against fire and other damaging influences and the succession process allowed to proceed toward producing a diverse cover.

2.2. Plantations in Production Areas

In existing plantations also intended for timber production, initial treatments consist of eradicating or controlling competing vegetation through weed control. This can be done through mechanically means or by application of herbicides.

Once the canopy of the plantation is close enough to suppress growth of competing undergrowth, treatments consist of improving the form of the planted trees (**pruning**) and then removing poorly formed individuals (**thinning**). Each of these intermediate treatments are done periodically. Pruning is usually done once or twice a year until the 4th or 5th year of growth.

Thinning is normally conducted every other year until a few years before harvest. As the plantation age increases, thinning becomes an economic activity because some of the trees cut can already be commercially disposed.

As with TSI, these activities must be preceded with an assessment of the condition of the plantation and followed up with growth evaluation.

2.3. Plantation in Protection Areas

In terms of permanent crops, upland farmers prefer growing fruit trees rather than planting timber species that take a longer time to harvest. Although more profitable than most agricultural crops, timber and some products from natural forests are generally not the main income sources. This is primarily because strict government regulations and complicated bureaucratic procedures hamper their harvesting and marketing. A dense fruit orchard wherein ground level vegetation is also growing serves well in erosion and water runoff control.

3. Treatments in Areas without Existing Permanent Vegetation

3.1. Context and Definitions

Rehabilitation is carried out in areas that do not, or have very little, existing permanent vegetation such as grass, openlands (new fallow areas) or brushlands. It can be done either by allowing natural processes to occur or through artificial means (tree planting).

Grasslands are those areas wherein the predominant vegetation is grass. In most cases, this is either *cogon* or *talahib*. A **brushland** is a mix of grass, bushes and some small trees. An **openland (or new fallow)** would be formerly cultivated areas designated for tree planting as the soil condition may have become too poor to sustain cash crops.

If left alone, any of these three types of areas would eventually evolve into a forest through the natural, but time consuming, process of "succession". If the intended purpose of the area is for protection, then this can simply be allowed to proceed.

However, if the intention were production, then this would not be a good option from either the economic or technical aspects. As such, there would be a need to introduce commercial species or hasten the development of those already existing through treatments similar to TSI. The methods for such are described in the following sections.

Figure 10. Brushland and Fallow Areas

3.2. Assisted Natural Regeneration (ANR)

Rehabilitating grasslands having a mix of woody plants (Figure 7) or "poorly stocked" brushland is done through the treatment called **Assisted Natural Regeneration (ANR)**. The practice mainly involves protecting the subject area against the major cause of forest destruction – fire, and freeing existing preferred woody species (trees) from competing vegetation (weeds and vines).

Depending on site conditions, this method may take a longer time for an area to become reforested but the result is a denser and ecologically more stable vegetation than can be achieved through planting trees. It also is much cheaper at half the cost (₱ 8-10,000/hectare as against ₱18-20,000). As such, the same method can be used in increasing the vegetation density in a degraded area. Experience has shown that, under this method, it may take at least five (5) years for a denuded area to regain a good tree cover. The major steps involved are diagnostic sampling, weed control, maintenance and monitoring and evaluation.

In the first step (diagnostic sampling), the subject area is inventoried for any naturally occurring woody species (wildlings). These naturally germinated from seed scattered in the area by animals or the wind. DENR standards on the acceptable number or wildings, are 600 per hectare. However, based on experience even 200 healthy individuals is acceptable, as long as these are evenly distributed over the area.

Figure 11: Type of area suitable for ANR

After the diagnostic sampling proves the area suitable for ANR, seedling locations need to be marked with stakes and weeds around these should be removed through either digging these out or by using a reliable herbicide. The normal width of this "spot weeding" is at least one (1) meter in diameter. Competition from those not eliminated, such as *cogon*, can be controlled through a regularly pressing (lodging). The most important factor in successful ANR, or all reforestation for that matter, is protection from fire.

The most important factor in successful ANR, or all reforestation for that matter, is protection from fire

The number of seedlings in the area is increased to at least 1,000 through enrichment planting with a suitable species. This is carried out in portions of the area devoid of any woody species. Survival and growth should be regularly monitored in the first 3-4 years.

3.3. Tree Planting or Conventional Reforestation

Artificial rehabilitation or tree planting involves more stages and greater cost than ANR. However, where the objective is for production purposes (i.e. timber), this method is most applicable as it allows control over the quality of the crop. The major steps involved are seedling production, site preparation, plantation establishment and maintenance.

The very first step would be to identify the most suitable species for the area. A simple way of doing this would be to inspect the area to see if there are trees of desired species growing in the area. Assess if the growth is good. If this procedure is not possible then the assistance of a person with extensive plantation experience should be sought.

In seedling production for plantations where the intention is to grow timber for harvesting, the acquisition of good quality seed is very important. **Poor quality seedlings at the start will result in poor quality plantation.** Unlike cash crops, it is not practical to correct errors with a long gestation crop like trees. Therefore, just like getting good quality seed for a crop like rice, purchase seed only from certified suppliers. Or else, if available, collect from good sources in the locality.

Setting up a nursery to raise the seedlings should be near a source of water for irrigation. For community based tree planting, it may be better to distribute the task of raising seedlings among several residents who live near a water source. This approach is lighter a burden on the organization and thereby cheaper yet still can result in good quality seedlings.

Site preparation consists of staking and preparing the planting holes and must be completed at least a month ahead of planting. It is best to eradicate all unwanted vegetation beforehand. If the existing vegetation is grass, the n controlled burning can be the means of clearing the area. This must be followed by herbicide treatment or digging out regrowth at least a one (1) meter around the planting spot. Other ways of removing competing vegetation is through strip or spot weeding. These are cheaper but result in increased follow up weeding activities.

Planting should only be with healthy seedlings which must have at least one foot of woody tissue from the base. Before each seedling in placed in the planting hole, some fertilizer should be added to boost its growth.

Maintenance for the first three years consists of weeding out competing vegetation. Pruning usually starts on the third year while thinning begins about two years later.

Monitoring of growth is a must in production plantations and must begin with height measurement. This can start on the second year of growth and include diameter once there is more than two (2) meters of clear bole (stem with branches). For large areas, it is more practical to establish growth plots. The method of establishing and these is the same as described in the above section on **Sampling the Vegetation**. Recording and computing for growth can be done as per the following example:

Size of Plot: 100 square meters
Number of trees: 110 trees

Year	Diameter (cm.)		Height (m.)	
	Average for plot	Annual Increment	Average for plot	Annual Increment
1	0	0	1.5	0
2	0	0	3.0	1.5
3	5	5	4.0	1.0
4	9	4	6.0	2.0
5	12	3	9.0	3.0
6	20	8	11.0	2.0
7	30	10	14.0	3.0

VII. Potential Income of Some Forest Products and Preferred Species

Timber is the most known and generally profitable of forest products. Because of this, more important benefits like water and clean air are overlooked. It is also an established fact that timber harvesting produces only one type of good yet results in the loss of others through the irreversible damage to the forest. **It is better to discourage communities from utilizing timber resources for local consumption than commercial purposes**.

If studied closely, gathering and disposal of non-timber products can provide good supplemental income. Yet, in some communities, such products are not being tapped because residents are unaware of a market. Hence, by increasing the value of a forest resource to the community, its conservation is assured. In the field, this can be ensured in coordination with the marketing component through any one or combinations of the following:

… by increasing the value of a forest resource to the community, its conservation is assured

- product diversification
- facilitating linkage with better markets for harvested goods
- improving access
- technical inputs for increasing production efficiency and increased product quality
- introduction of water-based facilities (domestic water supply, irrigation and power generation).

The following products and their potential incomes are based on a one-hectare module. Other potential products are likewise cited but these need further market studies in order to determine their worth to the communities. There was insufficient time to gather such information during before the preparation of this guide. It is suggested that the user take the initiative to conduct a market study on these and other possible products in his/her respective project site aside from validating the following information.

1.3. Natural Forest and Brushland

a) Timber flitches
   - Preferred species - lauan & other "hardwoods"
   - Maturity period - 25 years
   - Cutting rate - 3 trees/year
   - Net Production/tree - 650 board feet (BF)
   - Farmgate Price - ₱ 18/BF
   - Gross Annual income - 1,950 BF x P18/BF = ₱ 35,100.00
   - Average total production cost - 50% of gross inclusive of taxes & fees
   - Annual Net income - ₱ 17,550.00

b) Rattan as poles from enrichment plantings in brushland
   - Preferred species -
   - Maturity period - 12 years
   - Cutting cycle after maturity - every 6 – 8 years
   - Production/hill - 4 poles
   - Price - ₱ 18/pole
   - Density/hectare - 400 hills
   - Annual harvest - 50 hills x 4 poles/hill = 200 poles
   - Gross Annual income - 200 poles x P18/pole = ₱ 3,600
   - Average total production cost -
   - Net income -

c) Rattan baskets
d) Wooven Bamboo mats ("kalakat")
e) Lumbang nuts
f) Pili nut
g) Pili resin
h) Meat from wildlife
i) Live wild animals
j) Aquatic animals (eels)
k) Kaong fruit
l) Abaca
m) Anahaw palm fronds
n) Seedlings of endemic species
o) Herbal plants and fruits
p) Spagnum moss
q) Tree ferns for orchid growing

1.2. Plantation Species

a) Dimensioned timber (lumber or flitches)

- Preferred species - gmelina
- Maturity period - 8 - 12 years
- Density per hectare - 250 trees (net harvestable)
- Mode of harvest - selective cut
- Cutting intensity/period - 30 trees/year
- Production/tree - 150 board feet (BF)
- Price - P16/BF delivered
- Annual harvest - 30 trees x 150BF/tree = 4,500BF
- Gross Annual income - 4,500BF x ₱16/BF = ₱72,000

b) Logs
- Preferred species - falcata, mahogany
- Maturity period - 7 – 10 years
- Density per hectare - 250 trees (net harvestable)
- Mode of harvest - selective cut
- Cutting intensity/period - 30 trees/year
- Production/tree - 0.35 cubic meters
- Price - ₱1,500/BF delivered
- Gross Annual income - 4,500BF x ₱16/BF = ₱72,000

c) Rubber
- Maturity period - 6 years
- Production/hill - 4.5 kg dry sheet rubber
- Price - ₱20/kg
- Density/hectare - 450 hills
- Annual harvest - 450 hills x 4.5 kg/hill = 2,025 kg
- Gross Annual income - 2,025 kg x ₱20/kg = ₱40,500
- Average total production cost -
- Net income -

d) Bamboo poles
- Maturity period - 4 years
- Cutting cycle after maturity - bi-annual
- Production/hill - 20 pcs.
- Price - ₱30/pc
- Density/hectare - 50 hills
- Annual harvest - 50 hills x 20 pcs/hill = 1,000 pcs
- Gross Annual income - 1,000 pcs x P30/pc = P30,000
- Average total production cost -
- Net income -

e) Ratta n as poles
- Preferred species -
- Maturity period - 12 years
- Cutting cycle after maturity - every 6 – 8 years
- Production/hill - 4 poles
- Price - ₱40/pole
- Density/hectare - 400 hills
- Annual harvest - 50 hills x 4 poles/hill = 200 poles
- Gross Annual income - 200 poles x P40/pole = ₱8,000.00
- Average total production cost -
- Net income -

f) Pili nut
g) Pili resin
h) Aquatic animals (eels)
i) Kaong fruit
j) Abaca
k) Anahaw palm fronds
l) Herbal plants and fruits

GUIDE FOR UDP FIELD STAFF ON PREPARING A COMMUNITY FOREST MANAGEMENT FRAMEWORK PLAN

Introduction

Forest management is basically the practice of ensuring the most number of people enjoy benefits from a tract of natural forest or plantation on a sustainable basis. Much of the things used in daily life, like water, food, clothing, shelter, medicine can be traced as coming from forests. In fact, natural forests are viewed as life support systems.

The management system to be applied over a particular area is dependent on the benefits desired and whether the resource is a natural forest or plantation. Natural forests are more complicated but also provide all the benefits (air, water, food, shelter, clothing, medicine, etc.). Plantations are normally established for timber, fuel or food (fruit) production but can likewise provide some benefits in terms of improved water yield, soil erosion control and fuel.

Therefore, community level forest management planning must always start from what is expected or needed from existing or proposed forest resources. As such, the objectives of managing may be either for production, protection or a combination of both. Initial consultations in some UDP communities plus information gathered during land use planning show that the common needs from forests or plantations are for protection against soil erosion and of waterways and domestic water sources. In terms of production the needs are for fuel or construction material. Such as this guide is tailored for the formulation of a forest management framework primarily for these concerns. Where the interest is related to food production, such as fruit frees, the user is advised to refer to the agro-forestry guide prepared by the SAD component.

Objective

The basic objective is the preparation of a basic community forest management framework plan on forests and/or plantations to establish where these are or will be, how much (size) and for what purpose. This can be packaged in a short document (3 —*5* pages) outlining the management objectives (quantitative and qualitative), brief description on bow (methods and organization) and when these will be achieved including an attached map showing location and extent (hectares) of the existing and/or proposed forests/plantations.

Requirements in Preparing a Community Forest Management Framework

1. Information on:
   - 1.1. Quantity and quality of existing forest resources. This can be extracted from the land use plan and other plans prepared by the community.
   - 1.2. Resource related issues, problems and needs as documented in previously prepared plans.
   - 1.3. Local forest management skills, knowledge and practices
2. These community planners involved in previous planning activities.
3. Venue
4. Materials normally used for workshop type of activities
5. Facilitators

Procedures in formulating the framework

1. Organize a planning session with the community.
2. Begin the session with a clear explanation of the activity and what is the expected outcome.
3. Review the issues and problems documented in previous planning exercises. If there are others that are clearly forestry related but which were not taken up before, then these should also be considered. Classify according to related needs (water, food, shelter, etc.).
4. Have the community prioritize their forest-related needs. Quantify these whenever possible and determine the size of the support resource-base.
5. Establish the appropriate management policy and approach. Where water security, wildlife conservation or non-timber products (i.e. medicinal plants, rattan, extractives, exudates, honey, etc.) are desired, there should be no tree harvesting. The opposite applies where the need is shelter material or fuel. Therefore, sections managed under the first approach are considered as protection areas in contrast to production areas when tree harvesting is undertaken.
6. Formulate the plan on the basis of need along the following process:

6.1. For domestic water supply

The common domestic water sources in upland communities are springs or wells. Since these flow from under the ground it is not easy to determine their point of origin, which is called a recharge area. Land at this location should ideally be covered with thick vegetation to assure the maximum amount of rainfall is absorbed into the ground thereby ensuring a steady water flow at the spring outlet. Otherwise, much of the water would be lost to run-off.

Therefore, contrary to common perception, maintaining a forest cover at the outlet itself will not assure its sustainability. Nevertheless, where the spring is located between the middle and bottom of a slope, it can safely be presumed the land above comprises its recharge area.

Therefore, where the supply from the Present source is insufficient, the community can opt for either improving its productivity or tap additional ones. Where the first option is taken, the initial action is to determine whether the land above the source, and within its catchments, is either denuded or covered by very thin vegetation. Where there is denudation, the logical solution would be to revegetate.

Revegetating (or reforestation) can be done either by allowing natural processes to occur or through artificial means (tree planting). In natural revegetation, which relies on the process of"succession", the usual practice is to simply protect against the major cause of forest destruction-fire. This takes a long time for an area to become reforested but the result is a denser and ecologically more stable vegetation than can be achieved through planting. As such, the same method can be used in increasing the vegetation density in a degraded area.. Experience has shown that it may take at least five years for a denuded area to regain tree cover, under this method.

When planning future water **SUPPLY**, undertake the following procedure:

a) Determine the present total daily household water consumption (in liters) and multiply this by the projected number of households for the planned time **period.**
b) Using themes prepared during land use planning, overlay that **showing** existing sources (springs) over the one of projected settlements. On the basis of proximity **to** future settlement areas and water flow rates, prioritize which needs to be developed first.

c) **Gather information as to the production rate of the identified sources (springs). This is best done during long dry periods when the flow is weakest. Time how long it takes to fill a container with known capacity then extrapolate over a 24-hour period (ex. 30 secondsl20 liter can. SoIn.: 20 ltrs. X 120 seconds/hr. x 24 hrs.). Engineers with the Agricultural Infrastructure Support Component can show how to conduct this measurement.**

d) **Record the results and also indicate it adjacent to the corresponding source on the map. As such there will be two locations wherein the information is stored.**

e) **On a copy of the base map, delineate the micro-watershed wherein the identified sources (spring) are located.**

f) **Clearly and as accurately as possible draw the different land cover within each micro-watershed. Determine the area for each, using the grid method used in land use planning then record accordingly.**

g) **If there are forests or brush (fallow), classify the vegetation density as either closed (thick) or open canopy (thin). Where there are patches of earth exposed to sunshine, the vegetation forms a "open canopy". Otherwise it is "closed".**

h) **Given the information on production rate of each of the present sources and their location relative to future settlement expansion, it would be easy to determine which can be tapped for future use.**

I) **After determining which source will tapped for future use, look at the vegatative condition of the corresponding watershed and determine what mode and how much vegetative inte rvention (protect or plant) is needed.**

6.2. For irrigation needs

If the present supply is insufficient, first establish whether the root cause is due to poor vegetative conditions in the watershed. The reason can also be due to defects in the irrigation distribution system. The process of doing this is the same as that outlined in items d –fin the preceding section. A simple way of determing how much of the watershed needs to be improved (reforested or increase vegetation density) is to get the percentage of the area remaining unirrigated over the total and use this as a blow-up factor on the watershed. Example:

Watershed area: 1,000 hectares
Vegetated area in watershed: 600 hectares
Total irrigable area: 100 hectares
Actual irrigated: 80 hectares
Blow up factor: (100 —80) +100 = 20% or 1.2
Vegetated area needed in watershed: 600 x 1.2 = 720 hectares
Number of hectares to reforest: 720 - 600 = 120 hectares Irrigation sources can either be from surface (brooks, stream or rivers) or ground (Springs). If it is thought necessary to determing amount of water being produced, measuring that from a ground source is can be done following the procedure described in item c of section 4.1 (above).

Measuring the average stream flow from a surface source is best done in during dry and wet periods. The procedure involves laying out a fixed length section along the stream, measuring the width, taking the average depth and computing for the volume of this section. Timing how long it takes a floating object to travel from one end of the section to the other results in volume of steam flow per unit time (example: Volume of section = 3 cubic meters or 3,000 liters. Time floating object traversed length 3 seconds. Therefore: 3,000 liters ÷ 3 seconds = 1,000 liters/second).

6.3. For shelter needs

The process of determining how many hectares of plantation should be established to satisfy future construction material demand is described in the section describing Workshop 8 of the Upland Land Use Planning Guide. Natural forests containing harvestable trees within lands classified as production areas in land use planning can also be tapped for timber, if so desired by the community. However, these need to be subjected to a thorough assessment of their content before any harvesting can be done. Furthermore, harvesting will be regulated by procedures defined by pertinent DENR policies. Some communities already covered by forest management plans, have set more stringent regulations than that of the government.

6.4. For fuel needs

Fuel wood requirements can be satisfied by harvests in established plantations or timber removed from natural forests during treatments made to improve the stand quality (timber stand improvement). Unless a section of land will be planted specifically for fuel wood production, the material needed can be taken from the branches of planted trees harvested. For this matter, determining fuel wood consumption in order to estimate the how much area to plant is not necessary. However, it is necessary to map where the plantings are, or will be, for purposes of documentation and eventual monitoring and evaluation.

However, if so needed, a simple guide is that one sapling (about 10 centimeters diameter) contains enough wood to make three regular sized bundles of firewood. Given this data and the average daily consumption in terms of firewood bundles can be used to estimate the number of trees that have to be planted. Tree planting for fuel wood does not have to be in specific blocks. Community members can plant along the boundaries of their claims, home lots or claims.

6.5. Wildlife management

Wild animals and marine animals from rivers and streams have been a traditional source of meat for upland communities. Managing these on a sustainable basis requires the preservation of their habitat. Hence, these areas have to be identified and segregated as part of the protected zones. Determining the extent is too complicated a process for communities since it conflicts with other land uses. In such case, the planners will simply have to make the delineation on the basis of their "gut" feeling. What is important is to establish the practices by which protection of these habitats is ensured. This would include setting limits like bow many animals can be hunted or quantities of fish harvested in a given time. A good policy is to prohibit extracting for commercial purposes and that these benefits should be enjoyed solely by the community.

6.6 Other needs

This may consist of non-timber products like rattan, honey, ornamental plants, exudates like almaciga resin, or herval medicine. I contrast to timber extraction, the harvesting of such products can ususlly be done without a need for designating a zone within which it can carried out. However it is important the community sets limits on regulations have to be worked out in detail by the community.

7. **Consolidate the result of the planning worked shop, refine through consultation and validation with a broader audience. Get majority of community to indorse the plan.**
8. **In corporate into the sitio and CWP**
9. **Submit a copy to barangay officials for their information and preparation of proposed legislations.**