

**Procedures and Guidelines in
Conducting Upland Land Use Planning
for UDP Sites in Southern Mindanao**

(3rd Revision)

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1. Introduction

The first version of this guide was based on lessons learned during the preparation of Community Watershed Plans in the 1st barangays and drew heavily on experiences of LGUs within the region that prepared closely related Forest Land Use Plans. As such, it was also intended to be familiar and acceptable to DENR since almost all UDP-assisted communities fall within public lands administered by this agency.

The original process design was for a phased participatory formulation of a land use plan over a span of 13 days. However, due to time and budget constraints this had to be shortened to the present process that covers 3.5 days which was field tested in one project site in each of the five provinces covered by UDP from April 16 to May 9, 2001. Lessons learned during the field tests were consolidated in a workshop to refine the process on June 11, 2001. The output of this activity plus pertinent contents of the Upland Land Use Planning Facilitators Manual prepared by PPO1 (Compostela Valley) are incorporated into this present version of the guide.

This guide describes a logical process of allocating lands within a sitio or watershed cluster into production and protection areas. It provides a technique of generating reliable land cover and other related maps and procedures of using these in combination with other information to identify, analyze and resolve land related problems and issues. The result becomes a basis for the formulation of general village-level land use policies and selection of suitable interventions that would lead to future appropriate change in land use. It is designed for the use of the Municipal Planning Team (MPT) and project Agricultural Technician in coordination with Community Facilitators/planners.

These procedures were also designed to conform to the participatory approach that characterizes the Sustainable Community Development Process (SCDP) adhered to by UDP. As such, there are three major phases involved. The first is to generate awareness and need to carry out land use planning, schedule its implementation and prepare materials and references needed. The next involves facilitation of and assisting the community prepare their land use plan. Finally, there is the consolidation into the CWP, legitimization and incorporation of the output into the municipal plans in order to assure sustainability. The sequence of activities to be conducted with the community can be carried out separately so as not to significantly disrupt their normal livelihood activities.

Although based on actual experience, there will always be room for further refinement of these procedures and enhancement of guidelines. Users are therefore advised to modify the process according to local needs and conditions and encouraged to propose practical changes in future appropriate forums.

2. Pertinent Definitions and Concepts

2.1. Watershed and Critical watershed (per National Land Use Act)

Refers to a catchment area or drainage basin from which the waters of a stream or stream systems are drawn. Critical watershed is a water catchment of a river system which need immediate rehabilitation and protection on account of fast denudation leading to accelerated siltation and destructive floods primarily because of its support to existing, proposed or on-going hydro-electric plants, irrigation systems, local waterworks systems and domestic water facilities.

2.2. Land Use Planning (from National Land Use Act)

Refers to the act of defining the allocation, utilization, development and management of all lands within a given territory or jurisdiction according to the inherent qualities of the land itself and supportive of sustainable economic, demographic, socio-cultural and environmental objectives as an aid to decision making and legislation.

2.3. Thematic map overlaying

Manual thematic map overlaying is an analysis technique used to determine relationship of various conditions (themes) to each other or to validate a given assumption. Manual methods are limited by the transparency of the sheets. More flexibility is possible when done through a GIS. For community land use planning, overlaying does not have to be more than three sheets so this limitation should not be a cause for concern.

2.4. Scale

The relationship of the distance between any two points on the map, to the horizontal distance between those same two points on the ground.

2.5. Riparian zones

Within public lands, riparian zones are legally defined as those strips of land 40 meters on both sides of waterways beginning at the highest water level. Within alienable and disposable areas, the width of this band is not less than 20 meters on each side.

3. Basic Objective of Upland Land Use Planning, Requirements and Techniques

The most proper land use in the uplands is permanent vegetation like forests. However, since more than forty years ago, people migrated into such areas in Southern Mindanao and converted almost all the formerly forested lands to agriculture and settlements. The effect of such inappropriate land use is soil erosion, reduction in the water quality and quantity in the rivers and poor socio-economic conditions. Hence, the object of upland land use planning is to find a balance between productive and protective that are environmentally stable yet socio-economically acceptable.

Determining appropriate land use is a physical planning exercise and is different from sectoral planning. It relies heavily on the use of *maps* and employing the ***technique of thematic overlaying***. It also involves carrying out thorough situation analysis and making decisions as to what options to take in resolving conflicts that emerge during the process.

As such it is assumed MPT members are ***equipped with the legal, technical knowledge and most important, group facilitation and conflict resolution skills***. If not, then they will have to undergo a thorough orientation on environment management principles, upland policies and programs, watershed management concepts and practices, and most of all, group facilitation techniques. It is best this be carried out along an on-the-job training mode.

4. Planning Process: Phases, Activities and Steps

Phase 1: Preparation

Activity 1: Seminar/workshop on Environmental Awareness, Land Use Planning Process Orientation, Organization and Action Planning

Objective: To generate community awareness for the need to carry out land use planning and to come up with an action plan for implementation of the process.

Participants: Community leaders, community sectoral representatives, MPT

Duration: One-half (1/2) day

Venue: Sitio center

Inputs Needed: manila paper, pens, process documentation (still or video camera, tape recorder)

Steps:

1. Although this activity is intended for community residents, there may also be a need to conduct one for the MPT. Hence, members should honestly assess their own awareness and capabilities before going into community level proceedings. If there is a need, organize for a field staff level seminar on the matter, which may include reorientation on land use planning. If not, then proceed with one for the community.
2. At the community level, ask the participants to define what is the environment and identify its aspects. Divide the participants equally into three age groups then distribute manila paper sheet and colored pens to each group. Ask the oldest to draw what the environment looked in the past, the second group to draw the present and the group of youngest what they envision in the future.
3. Facilitate a discussion on the outputs by comparing the past with the present and identifying problems of the present. Have them compare the past with the present in terms of bio-physical characteristics, management practices and quality of life. Collect the output and set aside for future use.
4. Ask the participants to analyze the aspects of the environment and classify these into living and non-living components. Carry on the discussion further to identify which of the components is most important. Inevitably the result would point to the non-living.
5. After establishing such fact, guide the participants through an analysis of the aspects of the non-living component to determine the most important which are land and water.
6. From this juncture describe the objective of land use planning process in relation to watershed management. Emphasize the importance from the point of view of sustaining support from the local government by incorporation into various municipal plans.
7. Once the community members express support to the planning process, provide a very brief and clear description of steps of the process, supported with visual aids. This should not take more than 15 minutes and be followed with an open forum.
8. After the orientation, conduct an action planning session and selection of community facilitators and planners. This can be done in several sessions spread over separate days, according to the convenience of the participants.
9. Care must be taken to assure that this group will be composed of those persons who can and will effectively carry out the process. They should be those with good local

natural resource management knowledge and preferably some previous planning experience. It is also preferable they represent as wide a range in age as possible.

Activity 2: Base Map Preparation

Objective: Preparation of templates that will be used as the basic guide in drawing maps that will be derived during thematic map overlaying.

Participants: MPT

Duration: One (1) day

Venue: Provincial office, PPDO or MPDO

Inputs Needed: GIS facilities and if not available cartographic services, instruments and supplies

Steps:

1. Using GIS or through other means, prepare a sitio base map showing political boundary (if perimeter survey was done), the network of landmarks located with GPS, main roads (if surveyed), contour lines and the waterways as extracted from NAMRIA topographic sheets and grid in UTM coordinates. The contour lines should ideally be at intervals of 20 meters or less.
2. Given the average size of a sitio, the usual scale would be in the vicinity of 1:10,000 or less. Preparing this on an easel sheet or A1 size is sufficient. If the planning session is going to cover a cluster of four sitios, then the base maps of each should be of exactly the same scale.
3. If the sitio perimeter survey is still uncompleted, use GPS to find the position of as many man-made and natural landmarks are taken as accurately as possible. Map the result and proceed with preparation of the map.
4. If GIS facilities are not available then contract the services of a cartographer to prepare the base maps from NAMRIA 1:50,000 topographic sheets. In such case, the GPS readings of landmarks will have to be converted to the latitude and longitude coordinate system as this is what is used in the topographic sheets. Additionally, the grid will have to be further broken down into one minute from the normal five-minute intervals. The same conversions will have to be done with the perimeter survey information. Municipal administrative and infrastructure maps can be used as reference or data sources.
5. Since base maps contain contour lines, a preliminary protection area map showing areas above 1,000 masl, slopes greater than 50% and riparian zones, can be prepared to be used during planning sessions at the community.

Activity 3: Collection of References and information material

Objective: Gather information needed in land use planning and existing plans that will help guide the sitio land use planning

Participants: Selected MPT members. Preferably with cartographic knowledge

Duration: Depends on availability of references

Venue: Municipal Planning and Development Office (MPDO) or wherever there is suitable space for working with maps.

Inputs Needed: Time of MPT members, travel resources or facilities, copying facilities

Steps:

1. Refer to the list of maps in Table 1 and check for availability in the GIS database for the subject area. Reference can also be made to the table labeled as Meta-database found in the *Information Kits* that form part of the *Watershed Selection and Mapping Manual*.

Table 1. Thematic maps normally needed and their sources

Theme	Source
Slope	MPDO but better extracted from topographic sheets
Elevation	From topographic sheet, MPDO, BSWM
Soil	BSWM, MPDO, MAO
Barangay boundaries/political map	MPDO, DENR
Land classification	DENR
Infrastructure	MPDO, Municipal Engineer, DPWH
NIPAS and other protected areas	DENR
Mineral areas	Bureau of Mines
Geologic Hazards	Bureau of Mines
Ancestral Domains	DENR, NCIP
Erosion	MAO, MPDO, BSWM
DENR projects & LGU operations	DENR
Forestland Tenures	DENR

2. In the event these are not available in the GIS, collect the best copy from the sources also listed in *Table 1*. It must be made sure that the maps collected contain grid coordinates, indicates the projection used, datum or at least cites the original source. This is to facilitate eventual consolidation, rectification, validation, input into GIS and most of all, analysis. Usually most of the maps would be available in the MPDO, particularly if the municipality has undertaken Comprehensive Land Use Planning CLUP, Forest Land Use Planning (FLUP) or Barangay Development Planning (BDP). This is an important item to know so that budgeting for costly data collection and validation engagements can be minimized. Themes such as land cover, settlements, vegetative cover and some infrastructure information will be generated during sitio sketch mapping sessions.
3. Make copies of maps that need to be collected since almost all sources may not be able to lend their file copy. This is best done by manual tracing or digitizing. Other means of making copies of a map are by white/blue printing, sepia or photocopying. It must be noted that both forms have systemic errors. In white/blue printing and sepia copying the error proceeds along a longitudinal plane. In photocopying the error is radial (from the center). As with digitizing, these defects can be reduced by duplicating from large-scale (< 1:25,000) maps, if available.
4. Consult with the MPDO, PPDO, DENR, NCIP and other related agencies as to their plans covering the subject community. If these have been prepared as documents, then review the same and note policies, strategies, approaches and other interventions described that would have bearing on the community land use planning to be done.
5. Determine whether other government or private organizations have done similar planning activities in the community. Establish what bearing these have on land use and get copies of any documents, if possible.
6. Arrange for the services of one or several competent resource persons who can thoroughly provide information on upland policies, regulations, management programs, agro-forestry, SALT and other upland agricultural practices during the sitio land use

planning session. These persons can be found in DENR, the local ENRO, educational institutions and NGOs. It is also useful to gather printed or preferably, audio-visual material on samples of related community actions plus technologies that may be appropriate for adoption. Knowledge of these would better prepare the community in making decisions on options to be taken.

7. Discuss and thoroughly plan out the presentation to be made by the resource person(s). Make sure to keep presentations as short and simple as possible plus sufficient print material for distribution. If an audio-visual presentation can be made, then opt for this instead.

Phase 2: Facilitating Community Preparation of Thematic maps, Tabulated Data and Land Use Plan

<i>Objective:</i>	Community validation of existing cartographic information, generation of thematic maps and formulation of land use plan framework
<i>Participants:</i>	MPT and community planners/facilitators
<i>Duration:</i>	3.5 working days
<i>Venue:</i>	Community center
<i>Inputs Needed:</i>	Base map, plastic sheets, metacards, blackboard or whiteboard, chalk or white board markers, masking tape, pencils, permanent marking pens (fine or medium point) standard workshop materials (manila paper, pens, etc.), process documentation (optional), camera

Activity/workshop 1: Drainage Map Validation/Theme Preparation

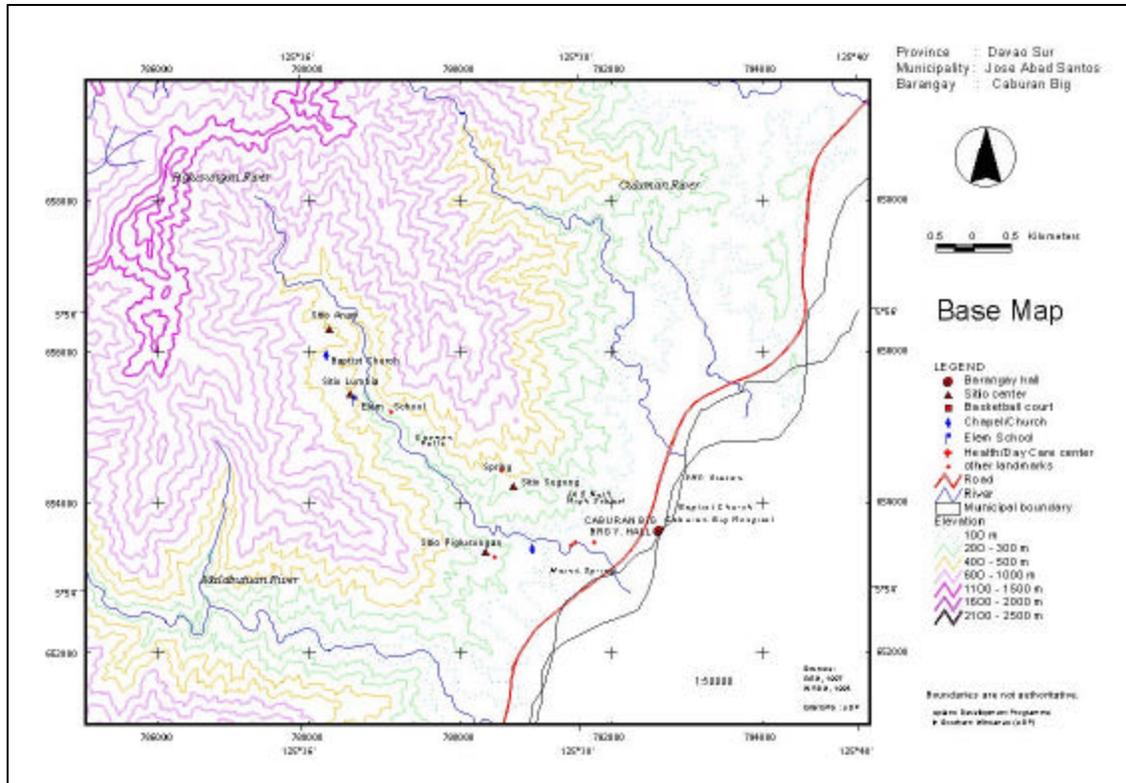
<i>Objective:</i>	Training participants on topographic map interpretation for validation of base map information and production of drainage system thematic map.
<i>Duration:</i>	No more than one and a-half hour
<i>References:</i>	Sitio Base map

Steps:

1. Group the participants according to sitio if the planning activity is for a cluster.
2. Explain that the first two mapping sessions will involve preparing maps that will provide information and at the same time serve as patterns in generating the succeeding themes. A good example is the framing of a house being built. Follow up the explanation with an open forum.
3. Provide each group with a copy of their corresponding base map (see *Figure 1*) and very thoroughly explain the features shown, particularly the contour lines. If necessary, use the illustration in **Annex 1**. If done properly, and depending on the interest of the participants, it is possible to teach them, within a couple of hours, to interpret the contour map such that they can reliably locate ridges and gullies.
4. Guide the participants through a discussion on differences between the base maps they have and sketch maps prepared during the environmental awareness session. Highlight the fact that the base map is a closer representation of actual conditions.
5. Once they acquire the ability to interpret the topographic features, ask them to check whether waterways indicated on the base map are correct or not. If not, then they should make the appropriate correction and thereafter indicate the name of the river or stream. Corrections can first be made with pencil on the base map. Knowledge of local

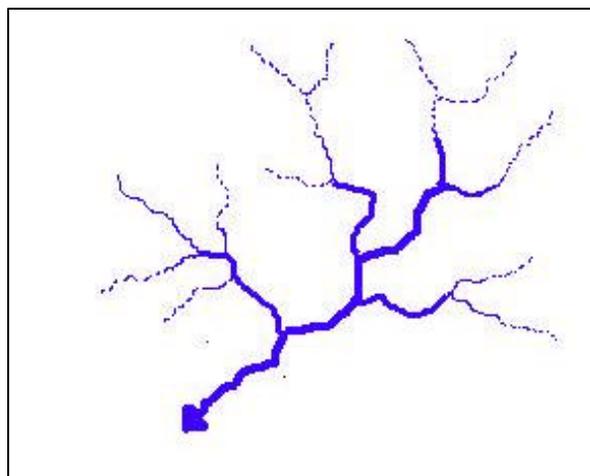
conditions by the technicians assigned to the area is important in guiding the participants towards correctly drawing the information needed.

Figure 1. Sample of base map showing topographic features and GPS landmarks



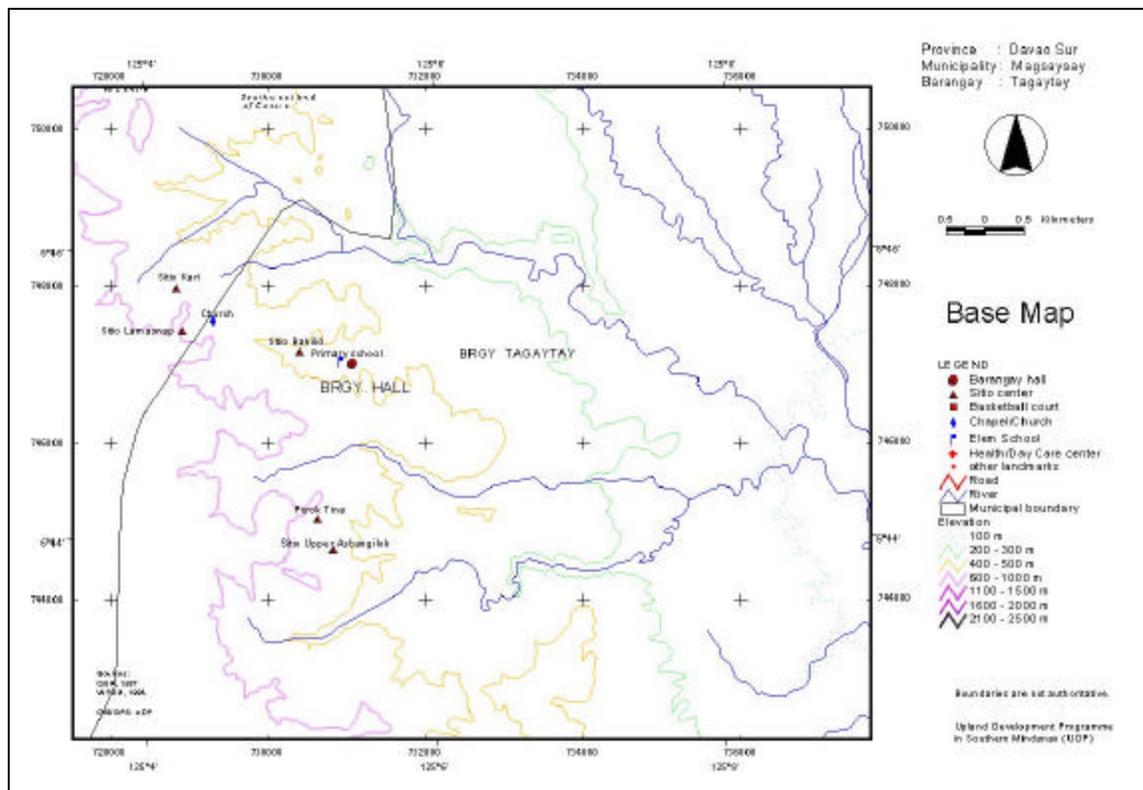
- Using main streams as reference, assist participants in identifying additional waterways plus as many gullies as possible. Instruct them to use unbroken lines to indicate streams that have continuous flow and a broken line for gullies and those that are intermittent (see *Figure 2*). Do not forget to label each stream, if these have names. Also make sure that an arrow indicates direction of flow, particularly where the waterway proceeds outside the sitio boundary.

Figure 2. Continuous and intermittent waterways,



7. The final product would be a completely detailed drainage system of the sitio. Other water bodies such as lakes or ponds and springs should also be incorporated in the map.
8. Once this is done, the group can attach a plastic sheet over the base map with masking tape. Have them trace the corners of the grid border and copy the UTM marks with a black permanent marking pen and the completed drainage system with a blue pen.
9. The map should be given a title in the local dialect if the participants feel more comfortable with this. The names of the group members, date the map was drawn and a legend for the information contained should also be included. This procedure must be followed in each theme prepared.
10. Have each group present and explain their output then facilitate a discussion for clarification and improvement of the completed drainage maps.
11. After the presentation ask the participants whether they can see how the completed drainage maps would be useful in locating all other items of information like their farms and houses. If the response is affirmative then proceed with the next mapping session. If negative or unsure, review the discussion on utility of the base map and explain how the drainage system can serve as reference in drawing other items.
12. In some cases, where the area to be mapped has moderate terrain and does not have a clearly defined drainage system (see *Figure 3*), it may be necessary to have the participants preliminarily draw the streams and gullies together with the network of roads, trails and footpaths. After which they can transfer these themes into separate plastic sheets or combine into one.

Figure 3. Sample of base map where topographic features are not very defined.



13. During the presentation it would be advisable to prepare a matrix (Table 2) detailing the conditions and problems of each water body¹. A rough estimate of the length of rivers, creeks and other streams including size of lakes or ponds can be made from the map. Other conditions such as water quantity and quality can be described in general terms such as “plentiful”, “continuous flow all year round”, “clean” or “dirty”. Major problems can be bank erosion, flooding, silted, dirty (either due to heavy silt load or pollution).

Table 2. Conditions of Water bodies

Water Body	Name	Physical condition (length, size, water quantity/quality)	Major problems
Rivers			
Creeks			
Lakes/ponds			
Springs			

14. More intensive discussion may be facilitated on the major problems to establish their causes and possible solutions. Such information would be useful in the planning stage.

Activity/workshop 2: Road Network and Infrastructure Theme Preparation

Objective: Facilitate the preparation of thematic map showing as many of the existing infrastructure as possible

Duration: No more than one hour

References: Sitio Base and drainage maps, MPDO maps and list of existing infrastructure

Steps:

1. Explain to the participants the information to be contained in the succeeding map and follow up with an open forum.
2. Ask what types of social - infrastructure can be found within the community and list these on the board or sheet of manila paper. These may be any public or private facility that is used by all or most members of the community.
3. Review and arrange the items in an orderly manner. Roads that have deteriorated and no longer passable to four-wheeled vehicles under any weather condition, can be classified as trails.
4. Decide what symbols and colors will be used for each item and indicate this correspondingly. The usual items of information and their corresponding symbols are found in Figure 4.
5. Have each group place another plastic sheet over both the base and drainage map. Again have them trace the corners of the grid and copy UTM values with a black marking pen.
6. Using the information contained in both themes as reference, assist each group in drawing the network of roads, trails and footpaths within the sitio.
7. With the roads and trails as an additional reference to the drainage system, the participants can then indicate the location of other infrastructure facilities like public buildings and domestic water supply systems.

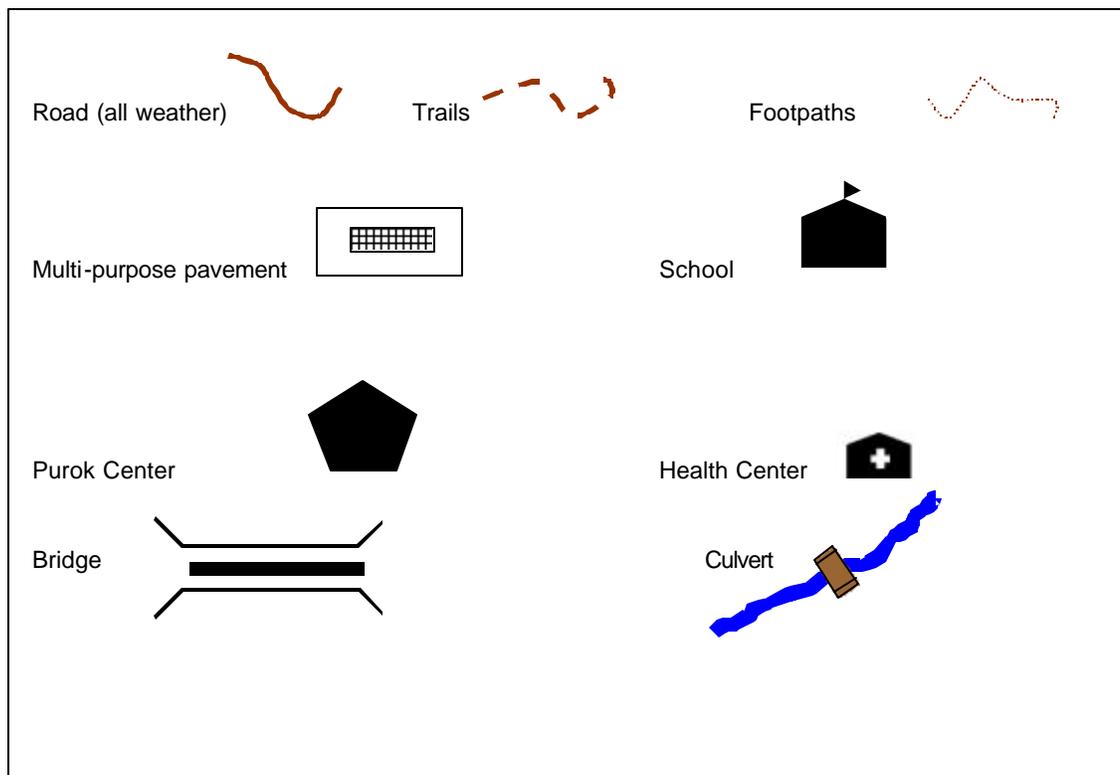
¹ From PPO1 Land Use Planning Facilitators Manual (May 2001 version)

8. It would be useful for later purposes to prepare a matrix of the conditions of the infrastructure facilities within the sitio (Table 3)². As in the drainage map, the length of roads and other access routes can be extracted from the map. Description of the condition can simply be described as “passable to all forms of vehicles even during rains”, “only passable to people and animals”, “under repair” or whatever modes of description as long as it is clear and can easily be understood. Other facilities such as buildings can be described appropriately (i.e. “excellent condition”, “roof leaking”, “pipe clogged with dirt”). Capacities can be expressed in terms of volumes for water systems, classrooms for schools, etc.

Table 3. Condition and Problems of Infrastructure facilities

Type of facility	Dimension (length, size or capacity)	Condition	Major Problems

Figure 4. Normally-used infrastructure symbols



9. Most social infrastructure such as multi-purpose pavements and purok centers are usually located very close to each other and occupy no more than one-fourth hectare. In a map with a scale of 1:10,000 or more, this is equivalent to at least one-fourth of a square centimeter, or less. As such, it is not possible to draw the symbols proportional

² From PPO1 Land Use Planning Facilitators Manual (May 2001 version)

- to the map scale. In such case, indicate only the purok center but make a note of the presence of other structures in the legend.
10. As soon as all groups have completed this theme, facilitate a presentation and discussion of the outputs. As in previous session, the object is to clarify and improve the outputs. A discussion of on the root of major problems of these facilities can also be taken up at this point.
 11. Again ask the participants whether the combined two themes they produced would make it easier for drawing other kinds of information. This fact should be clearer to them at this point.

Activity/workshop 3: Settlements Theme Preparation

Objective: Preparation of thematic map showing the location of as many of houses as possible.

Duration: No more than one hour

References: Base, drainage and road network maps, existing demographic information in the form of maps or tables.

Steps:

1. Explain what the succeeding session will involve and that information generated will be most important to land use planning. Follow this up with a short open forum.
2. Ask the participants what symbol and color they prefer for represent houses. Ask the participants how many households there are in their community and what is the smallest number of household in a cluster and set this as the minimum that will be represented per symbol.
3. Align and fix the drainage and infrastructures themes over each other. Attach with masking tape. These now serve as guide (reference) for preparing the next theme.
4. Have the participants lay a blank plastic sheet over these themes. Again ask them to trace the corners of the grid and copy UTM values.
5. Proceed with drawing the location of clusters of houses.
6. Houses that are very dispersed from the clusters can be represented individually but care must be taken to draw them as small as possible so as not to result in proportional distortion.
7. As soon as all groups have completed this theme, facilitate a presentation and discussion of the outputs. As in previous session, the object is to clarify and improve the outputs. Major problems facing settlements and their causes can be discussed at this point. These may be those in relation to infrastructure facilities such as access facilities and domestic water supply. They may also have to do with raw material supply. These must be noted as they may later have implication on proposed land uses.

Activity/workshop 4: Land Cover Theme Preparation

Objective: Facilitation of the preparation of a thematic map showing as many of the different types of vegetation

Duration: One and a-half hour

References: Base, drainage and road network maps, area grid.

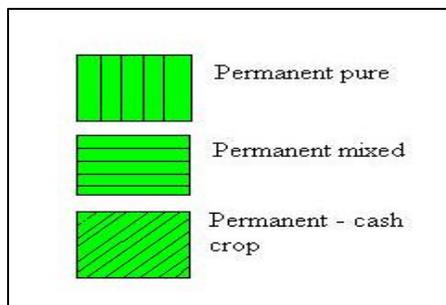
Steps:

1. Explain what kind of theme will be produced from the session and follow with a short open forum.
2. Ask the participants what different kinds of vegetation (land cover) grow in their areas.
3. If the base map scale is 1:10,000 or larger, then only areas where the vegetation type covers one-half hectare or more should be considered. The reason again being the same as with the infrastructures map (very small items can no longer be reflected proportionally). This consideration must be clearly explained to the participants. It would be useful to present an area grid template (**Annex 2**) to show how large one hectare, or a fraction, would look on the map. It would further be useful if samples are presented in various basic shapes (square, rectangle, circle, triangle, trapezoid, etc.)
4. Write down each land cover type in a metacard and post on the board. Ask the participants to differentiate and group these into planted (agricultural) and natural growth.
5. Facilitate further analysis to subdivide planted vegetation into cash crops, permanent of only one species, mixed permanent species and permanent and cash crop mix. Fallow areas can be treated as natural growth or agricultural, depending on what the eventual use of the land will be within the next five years.
6. After identification and classification the major categories would usually be:

Major Use	Land Cover Category	Usual type of vegetation
Agricultural	Cash crop	Corn, peanut
	Permanent pure	Tree woodlots (gmelina), coconut
	Permanent-mixed combination	Mixture of several fruit trees
	Permanent-cash crop combination	Coconut with intercrop of corn
Natural	Fallow ("lati")	Grass or shrubs for new fallow. Mixture of trees and other plants for older areas.
Forest	Forest	Second growth or virgin
Grass	Grassland ("kasagbutan")	Cogon, talahib
Water bodies	Swamps or marshes ³	

7. Ask what color code to use for each land cover category. If there are more categories than available colored marking pens, then hatching may have to be resorted to but preferably used for one common category like permanent crop combinations. Post the color or hatching across each corresponding category.

Figure 5. Hatching examples



8. Have the participants place a new plastic sheet over both the drainage and infrastructure maps. Again have them trace the corners of the grid, copy UTM values

³ From PPO1 Land Use Planning Facilitators Manual (May 2001 version)

- and indicate the title of the map after which they can proceed with drawing the different land cover categories.
9. Advise the participants that drawings should approximate the actual shape of every category. Also remind them that there should be no vacant portion left in the map except those covered by rivers, streams, roads and other access facilities plus structures such as houses, schools, multipurpose pavements, etc.
 10. As soon as the theme has been completed, provide each group with an acetate of the area grid. Instruct them (see **Annex 3** for sample) on the use and what is the equivalent area per square centimeter on the grid.
 11. Record the information derived in the following format:

Table 4. Existing Land Cover/Vegetation

Land Cover Category	Existing Vegetation (Land Cover)	Area in hectares	Percentage of Total
Total			

12. Have each group present and explain their output and thereafter facilitate an open forum geared toward clarification or improvement of the map presented. Point out the major land cover or use and facilitate discussion on trends (i.e. increasing size of agricultural or other land use? Why?) and effect on the land conditions (depletion of soil fertility, etc)⁴

Activity/workshop 5: Protection Areas Map Preparation

Objective: Identify and map protection areas within the community

Duration: One and one-half hours

References: Drainage, infrastructure and land cover themes, slope map of similar scale to base, DENR NIPAS areas map, erosion map, provincial and municipal ordinances on protection areas

Steps:

1. Explain what kind of theme will be produced during the session then follow up with a short open forum.
2. Have the participants overlay a blank plastic sheet over the base, drainage and infrastructure maps. As usual have them trace the corners of the grid and copy UTM values.
3. Start the session by asking the participants if there are any areas within the sitio(s) being protected against any human activity by virtue of an ordinance, resolution or just a simple understanding among residents. This usually will be those around water sources, riverbanks and very steep land that cannot be tilled. Post this information on the board.

⁴ From PPO1 Land Use Planning Facilitators Manual (May 2001 version)

4. Ask how the extent of these areas is defined and the size either in hectares or meters. It may again be necessary to explain the fact that one hectare is equivalent to 10,000 square meters.
5. If copies of municipal ordinances on protection areas are available, present these to the participants and ask if they are aware of such. If not, then solicit reactions on whether they agree with it. If the response is positive, then post this item on the board for consideration later. If the response is negative lay the issue aside to be taken up in a future dialogue with appropriate municipal officials.
6. Ask DENR and other agencies such as NCIP, whether they also have identified protection areas within the community. If there are, ask the participants for their feedback on the matter. Again, if the response is positive, post the item on the board. If negative, then initiate as short a discussion on the matter, if the line agency representatives are in a position to help resolve it. If this is not possible then also lay the issue aside for future resolution.
7. After all local policies on protected areas have been discussed take up those falling under the National Protected Areas System (NIPAS) defined as:
 - a) Lands with slopes greater than 50%;
 - b) with elevations above 1,000 masl;
 - c) patches of virgin forest of more than 50 hectares; and
 - d) riparian zones (40 meters on both sides of waterways in public lands and 20 meters on both sides in alienable and disposable lands)
 - e) identified and declared habitats of protected fauna
8. Thoroughly explain to the participants reasons why such restrictions have been promulgated. It would help to present this relative to their interest, such as the need to save the soil on which they make their living.
9. It may also be necessary to define what is virgin forest and provide a thorough explanation of what are riparian zones.
10. It must also be explained that identification of protection areas does not mean complete curtailment of human activity, like farming, but rather to find out how to manage these in a manner that will avoid either loss of soil or degradation of the vegetation in these areas. If the sitio(s) are within public land and are to be covered by a CBFMA or CADT, then it must be stressed that identification and management of NIPAS areas is a requirement.
11. Once the participants are satisfied with the explanation add the NIPAS prescriptions to the posted list of protected areas. Explain that these will also have to be mapped and then ask for suggested color codes and symbols or hatching to be used.
12. Have the participants overlay a new plastic sheet on the slope map and mark define areas 50% and steeper. In the absence of a slope map, the base map will have to be used and it will be necessary to explain how to define areas above 50% slope given the scale and contour interval. This is described in Steps 13 – 16.
13. Percent slope is represented by the formula: $\text{rise} \div \text{run} \times 100$ or $\text{elevation} \div \text{horizontal distance} \times 100$.
14. Get the quotient of contour interval (in meters) over the percentage in decimal format ($50\% \div 100 = 0.5$). Example:

Scale = 1:50,000
Contour interval = 20m
Computation: $20\text{m} \div 0.5 = 40\text{m}$

Therefore, using the above example, contour lines 40 meters apart represent areas where 50% slopes begin. All other contours that are of less distance apart are above 50%. Since the map scale is 1:50,000 this means that every millimeter on the map is equivalent to 50 meters on the ground because there are 1,000 millimeters per meter (formula is $50,000 \div 1,000 = 50$). Therefore $40m \div 50m = 0.8$ of a millimeter. This is the distance between contours on the map where 50% slopes begin.

15. On a slip of cardboard, thick paper or plastic, mark the map distance representing the start of 50% slopes (0.8 mm in the above example). This serves as the slope guide template.
16. Move the slope guide template along contour lines and mark out all areas that fall above 50% slope (lines less in width than the guide) by shading with a specific color or hatching to derive a map showing all areas above 50% slope.
17. After areas with slopes above 50% have been marked locate the 1,000-meter contour lines and shade or hatch areas higher than 1,000 masl elevation.
18. Remove the plastic sheet from the base map. Overlay this on the vegetative/forest theme and mark out all virgin forests, if there are any.
19. If there are known habitats of protected fauna and sites of cultural or historical significance that need to be protected then map these too.
20. Remove the plastic sheet from the vegetative theme and place over the drainage and infrastructure themes. Use these as a guide in locating identified habitats, cultural and historical sites. Sources of information may be existing maps (see *Table 1*) or knowledge of DENR or LGU participants.
21. Additional protection areas can also be incorporated as derived from the erosion and geologic hazard maps (see *Table 1*) to take in areas over fault lines or susceptible to volcanic activity.
22. Extract the area of the identified protected areas then conduct a discussion on problems and issues facing these. It would be useful to have the participants prepare a matrix on the characteristics of these areas (see *Table 5*).⁵

Table 5. Characteristics of Identified Protected Areas

Identified Protected Areas	Estimated Land Area (has)	Present Land Use (are they still being protected? Why?)
Proclaimed watersheds, forest reserves, national parks etc.		
Virgin Forests		
Civil & military reservations		
NIPAS areas		
Other (specify)		
Problems and concerns:		

23. Have each group present and explain their output and thereafter facilitate an open forum geared toward clarification or improvement of the map.

⁵ From PPO1 Land Use Planning Facilitators Manual (May 2001 version)

Activity/workshop 6: Identification and mapping of Land-related problems and Issues (Conflict areas)

Objective: Identification and mapping of land related problems and issues

Duration: One and a-half hour

References: Base, drainage and road network maps, sketches of present situation made during environmental awareness seminar/workshop.

Steps:

1. Conduct a review of the preceding activities/workshops and explain that the maps generated comprise the information portion of the planning process. Explain that the next workshop marks the start of the analysis and plan formulation phase. Describe the main tasks to be undertaken and then allow time for a short open forum.
2. Explain and discuss the topics of land use conflict and issues facing the uplands. Examples of these conflict areas are:⁶
 - A & D areas in NIPAS areas
 - Settlements inside or at the periphery of protection forests
 - Poorly managed/undeveloped tenured areas
 - Protection forest without forest cover
 - Production forest without forest cover
 - Cultivated steep slopes
3. Post the sketch of existing environmental conditions made by the community and the identified problems. Review the purpose of the planning activity. With this in mind ask the participants to discuss and segregate which of the problems presented are land use related. Post or write the result on the board.
4. Assist the participants in scrutinizing the items and determine which of the problems are related. Rearrange the list accordingly and then facilitate analysis of each to find the main cause or basic problem(s). Usually, these would be soil infertility, erosion and landslides.
5. Ask the participants if they think these problems can be mapped. By this time their comprehension of the logical sequence of the process should be clear, and their response would be positive.
6. Proceed with having them designate colors or symbols for each of the problems or issues.
7. If the response is negative, review the planning process (objective -> gather information -> analyze -> option -> decision) and use planning of a usual farm activity as an example.
8. Once the participants show an understanding of the process, ask them to place a new plastic sheet over the drainage and infrastructure themes and draw the location and extent of the problems.
9. Ask the participants to place the new theme (problems & issues) over that of the land cover and protected areas. It is most likely that locations of the land use problems would coincide with protection areas without vegetation and/or where the land is being tilled. The community normally knows this fact but this exercise serves as a logical cartographic means of documentation. It also provides an opportunity to identify

⁶From PPO1 Land Use Planning Facilitators Manual (May 2001 version) and DENR-NRMP Forest Land Use Planning Manual

- additional protection zones not cited earlier plus activities contributing to the problems like unregulated cutting of trees in protection areas.
10. Lay the protection areas theme over the infrastructure and settlements maps. This exercise should show where infrastructure such as roads, which may be contributing to erosion and landslides and where settlements may also be located in protection zones. If such problems become evident, then incorporate the information into the problems and issues theme.
 11. Have each group present and discuss their completed output and subject these to a critique and open forum for clarification and improvement.

Activity/workshop 7: Options (solutions) Selection, Policy Formulation and Proposed Land Cover Mapping

Objective: Generation and selection of options to resolve problems, formulation of general and specific land use policies and preparation of a proposed land cover mapping based on options selected.

Duration: Two and on-half hours

References: Land-related problems theme, resource persons, reference materials on orientation topics

Steps:

1. Explain the purpose of the succeeding activity and follow with a short open forum.
2. Using methods on computing areas described in Annex 3, determine the size (hectares) of each land use problem area from the subject theme and tabulate the result in *Table 3*. Rank numerically from least to most extensive.
3. Ask the participants to determine the number of people affected and record the information in the appropriate column of *Table 3*. Again rank each problem from greatest to the least number affected.
4. Add the rank values of extent and persons affected to determine the most severe of problems. This will give an idea of where remedial actions can be focused first.

Table 6. Land Use Conflicts/Issues

Problem/Issue	Extent (has.)	Rank	No. Persons affected	Rank	Overall Rank

5. Have each group present their output for discussion.
6. Conduct the resource person's presentation or that of the audio-visual material and distribution of printed matter on options available for resolution of the problems and issues. Conduct a short open forum after every presentation.
7. Facilitate an analytical discussion of each sitio's strengths and weaknesses using the SWOT or similar techniques. Post the results on a sheet of manila paper.
8. Using the focus group discussion technique, assist the participants in coming up with several options to each problem, in order of priority. These options should be based on the result of their problem analysis, within the extent of their capabilities as determined by SWOT or other techniques, and guided by their enhanced knowledge of

technologies, existing government policies, program and approaches. The options can come in the form of approaches, implementation schemes, and specific projects/activities or courses of action and presented in the following format:

Table 7. Proposed Policies and Options for Protection areas

Issue/Land Use Problem	Description (Extent, frequency)	Policy(ies)	Approaches/Programs

9. Have each group also formulate policies pertaining to land use in general and specific to protection areas given current conditions and issues. These should be written on sheets of manila paper.
10. For each selected option have the participants determine the resulting land cover using the same categories as those in Workshop 4. Post this correspondingly.
11. Having arrived at the appropriate courses of actions and corresponding land cover, each group can now proceed to mapping their decisions.
12. Have each group place a new plastic sheet over the problems and land cover maps. Again trace the grid corners and then name the theme as **Proposed Land Cover map**. The participants can then draw the land cover resulting from each course of action.
13. After the proposed land cover is completed, have the participants again derive the area of each land cover category and tabulate this with that of the existing land cover into the following format:

Table 8. Change in Land Cover

Land Cover Category	Existing Vegetation (Land Cover)	Area (has.)	Proposed Vegetation (Land Cover)	Area (Has.)	Increase (Decrease) in hectares

14. Have each group present their outputs and facilitate a discussion with the object of refining the results.

Activity/workshop 8: Integration of themes and Sitio Cluster Land Use Plan Formulation

Objective: Integration of themes, cluster level differentiation of proposed land-cover categories into land use classes, projection and mapping of settlement, agricultural and forestry spatial requirement (proposed land use plan)

Duration: Three hours

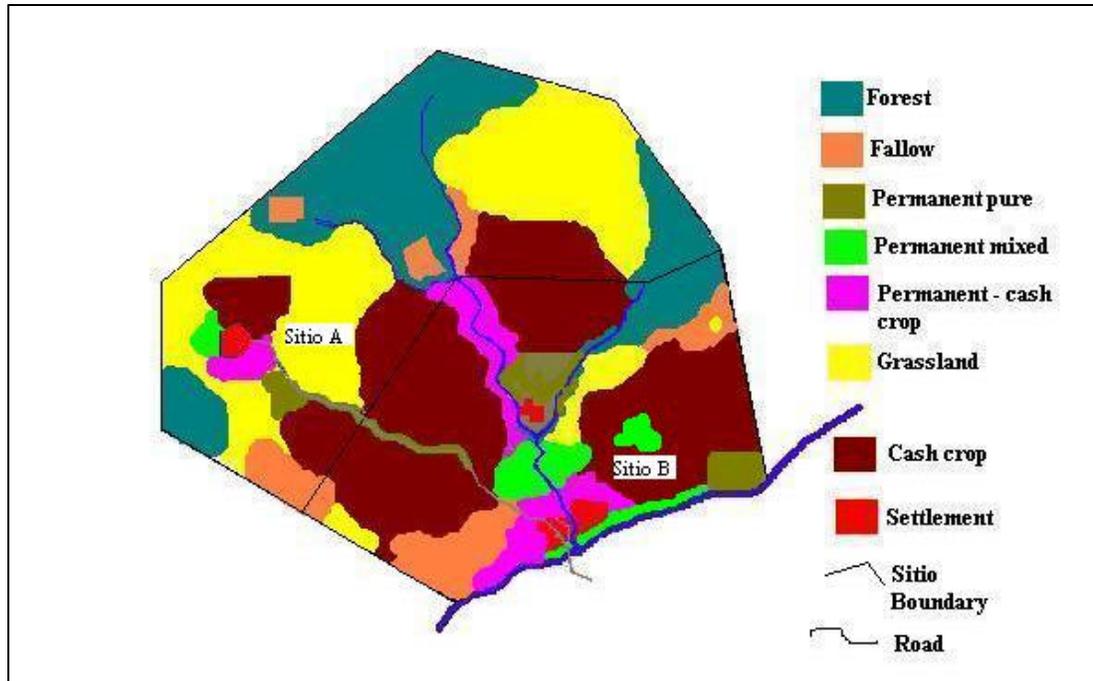
Venue: Community center

References: Maps, tables and other outputs of previous activities, base map templates, AEZ, socio-economic data from PRA

Steps:

1. Post previous outputs within the venue before starting the workshop.
2. Conduct a recapitulation of previous activities followed by an orientation on the workshop.
3. Following the order they were prepared, have the participants integrate each theme into one cluster by simply joining their boundaries. Check each output for inconsistency such as continuity of a feature from one sitio to another (see *Figures 6 - 7*). This usually occurs with land cover and roads information.

Figure 6. Actual Land Cover of Sitios A & B

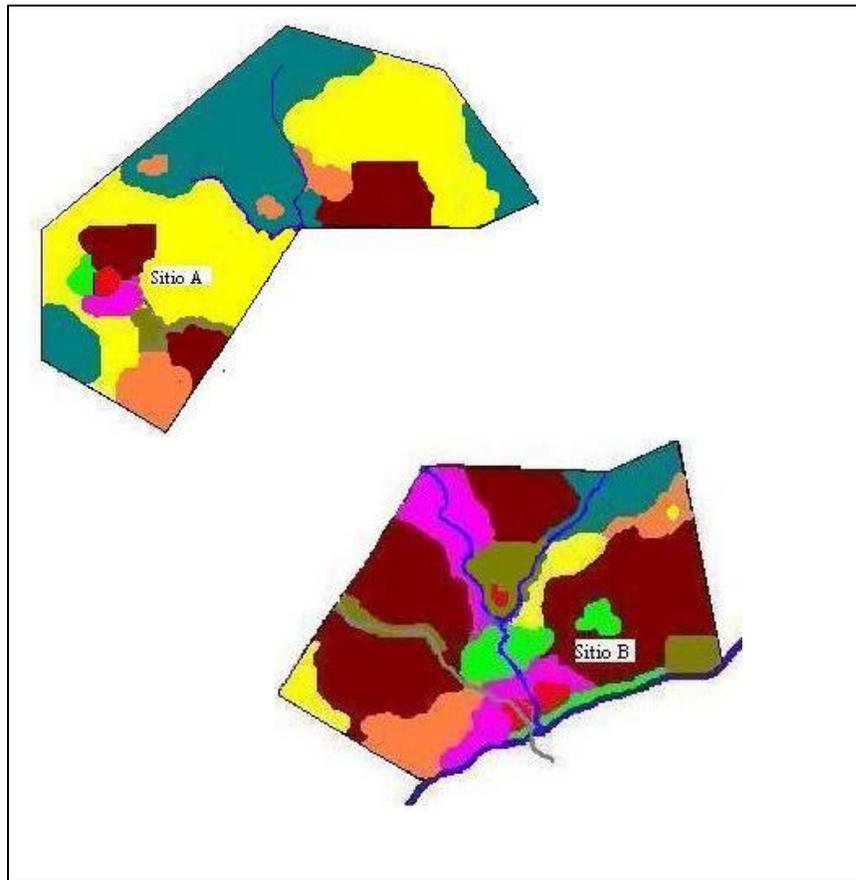


4. Once all the themes have been integrated and corrected ask the participants to review the **proposed** land cover categories and differentiate them into agricultural or forestry for the whole cluster. They may also identify and include special uses such as grazing areas, water impoundment and fishponds. Write these on the board with the corresponding land cover.
5. Present a tabular history of the community's demography in terms of number of persons and households, as derived from MPDO records. Ask the participants to validate this information and then calculate the increase for every five-year period. Assign a color for every period and tabulate the data as follows:

Table 9. Historical Demographic Change

Five-year period (past)	Population	Households (#s)	% Change	Color Code

Figure 7. Land Cover Maps as drawn by each sitio



6. With this historical data, ask the participants to lay a new plastic sheet over the drainage and infrastructure themes and map the location of households for every past period. As in preparation of the settlements theme, clusters of five houses can be represented with one symbol. The output will be a graphic representation of the history of settlement growth and can be titled as such.
7. Using the historical demographic data request the participant to project and tabulate the change in number of households over the next twenty-five years. This is the length of tenure of a CBFMA and may be useful for future planning.
8. Have them lay a new plastic sheet over the settlement growth theme and map out projected changes (growth) using the same procedure in Step 5. Title the map as **Projected Settlement map**.
9. Ask the participants to overlay the projected settlement theme over the protected areas map to determine if expansion is into areas inappropriate for settlements (i.e. protection zones). Have them select more appropriate areas using information in the slope and land cover map. Modify the projected settlements theme accordingly.
10. Using data in Table 9, have the participants determine the area of expansion (or contraction) for the first five years. Do this by simply multiplying the number of houses by the average residential lot area. Divide the result by five years to get the annual area requirement.

11. Using the modified projected settlement map, define the extent of expansion.
12. Use the same approach (Steps 4-6) to produce a projected agricultural lands map.
13. When projecting area requirements for social infrastructure, please refer to the standards in Annex 5.⁷
14. The same procedure can also be carried out for forest areas but the result will most likely reflect a decrease in this type of land use. As such, historical data cannot be used for projection but future changes would be dependent of the extent of agricultural lands being reverted to forestry use such as those for timber production and protection areas.
15. From the data on projected settlement growth, the participants can make a reliable estimate on the annual amount of wood requirement for building construction. Let them divide the annual growth in number of households by the average yield of 150 board feet of lumber per tree from a mature fast growing reforestation species like *Gmelina arborea* to determine the number to be planted annually. Further dividing this by the product of the spacing (i.e. 3m x 3m = 9sq.m.) would result in hectares of plantation. The assistance of DENR personnel or an experienced forester would be very useful at this point.
16. For protection forests, simply extract the area of those proposed by the community.
17. Consolidate the proposed settlements, agricultural and forestry areas into one map. Suggest the use of color codes and symbols contained in Annex 4. Explain that these are the same as those by government planning offices and would therefore facilitate the endorsement, adoption or legitimization of the community land use plan.
18. Again have the participants extract the areas of each use and tabulate in the following format:

Table 10. Proposed Land Use

Land Use	Proposed Land Cover	Area (has.)	% of Total

Phase 3: Finalization, Consolidation and Plan Legitimization

Activity/workshop 1: Digitization, validation and final packaging

Objective: Digitization of community prepared maps, printing, validation and finalization

Duration: One week

Venue: PPO, MPDO and Community center

Inputs Needed: Maps, tables and other outputs of previous activities, automated (GIS) or manual cartographic facilities and services, computer and printer

Steps:

1. Have the participants organize all outputs (maps, tables and policies) in the sequence they were prepared.

⁷ From Volume V of Guidelines for the Formulation/Revision of Comprehensive Land Use Plan by Rules and Standards Development Group- Housing and Land Use Regulatory Board

2. Assist them in forming a Land Use Plan Committee. This group will take responsibility of finalizing, packaging and having the plan legitimized.
3. Digitize each theme produced by each sitio then print in same format and scale.
4. Arrange for a one-day validation workshop with the same set of participants and present to them the completed output for validation. Note comments and corrections directly on the printed maps.
5. Bring the workshop output back to the PPO and edit the changes on the maps. Print in the same format and scale and make copies for the sitio, barangay, MPDO and DENR or NCIP.
6. Submit to and seek assistance of the MPDO in packaging the integrated outputs into the specified format.

Activity/workshop 2: Consolidation, Incorporation and Legitimization

Objective: Consolidation into the CWP, integration into municipal plans and legitimization

Duration: One week

Venue: Community

Inputs Needed: Final plan package

Steps:

1. Conduct a workshop for consolidation the land use plan into the CWP.
2. Assist the sitio cluster organization in preparing the documentary requirements for coursing the final plan through the process of incorporation into the municipal land use plan and eventual legitimization.
3. Rehearse pertinent sitio/cluster leaders for a presentation of the plan, if so needed.
4. Coordinate with the barangay chairperson and MPDO for endorsement of the document to the MDC for recognition and incorporation into municipal plans.

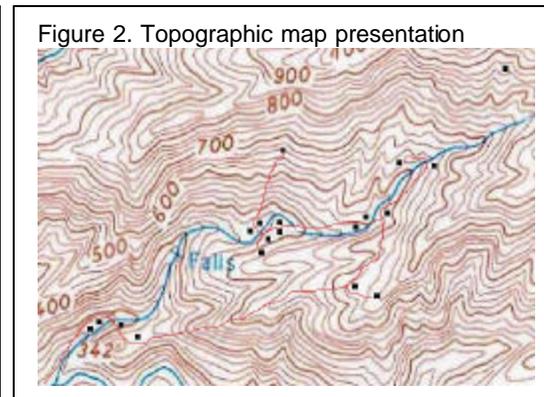
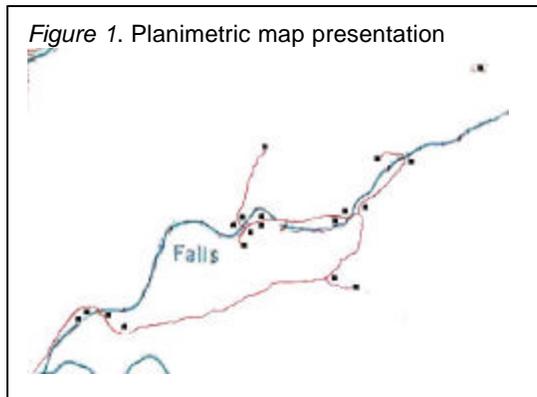
Annex 1

Guide on Topographic Map Interpretation

Guide on Topographic Map Interpretation

1. Types of maps:

There are two basic types of land maps. One is called planimetric while the other is topographic. The first only project what is called a two-dimensional view and therefore indicates the location and extent of features represented. Topographic maps, on the other hand, are three-dimensional and show elevation which is represented by *contour lines*.



2. Interpretation of contour lines

Each contour line represents one elevation reckoned from sea level. In the illustration (Figure 2 & 3) elevation ranges from less than 300 to 1000 meters. In all topographic maps there is a fixed elevation difference between each line. In this case, it is 20 meters.

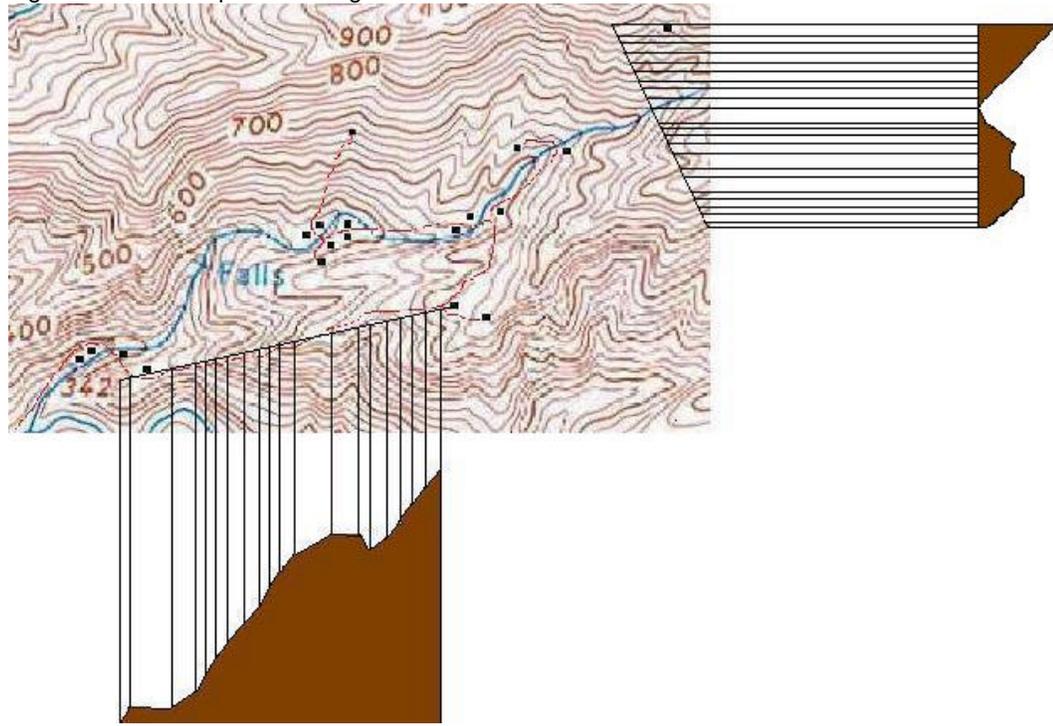
Lines also indicate slope. The closer to each other, the steeper the slope. Aside from these two points of information, the contour lines show what the terrain looks like as can be seen in Figure 3. There are two cross-sectional lines in the illustration and the brown colored areas define the terrain represented.

The lower one more or less follows a ridgeline. As can be seen, the slope proceeds upwards and changes according to the distance between contour line. After the first crest the slope again goes downward. This is because the cross-section line had cut across a gully before again climbing to a higher elevation.

The other cross-sectional line on the right portion of the illustration cuts across the upper portion of a small watershed. As can be seen in the projection (brown colored shape), the terrain proceeds downward into the river. From there it goes up, over the top and down the opposite slope of a hill.

As may be noted, where there is a ridge or river, contour lines form into an arrow-like shape. In the case of rivers, the arrows always point upstream and in the opposite direction for ridges.

Figure 3. Terrain depiction through contour lines

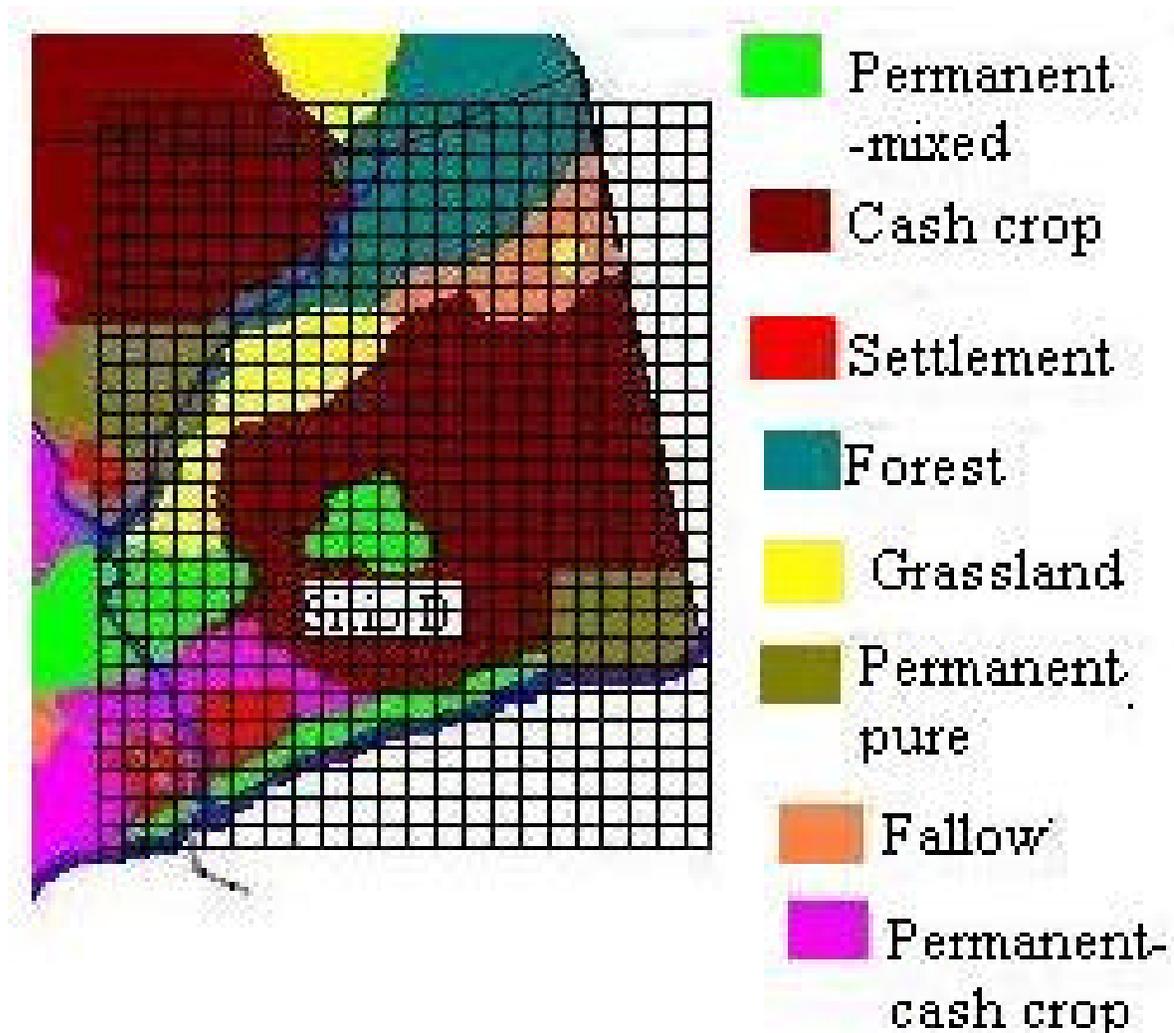


Annex 2

Area Grid Template

Annex 3

Illustration on How to Use Area Grid



Instructions:

1. Lay the grid over the subject area.
2. In the above example the map scale is assumed to be 1:10,000 while each square in the area grid is equal to 1 square centimeter. Therefore, each square centimeter is equal to one hectare on the map.
3. To get area, simply count the number of squares covered by one land cover category. There would be instances where a square may cover more than one category. In such case, estimate in terms of percentage the area covered by each.
4. In the above map, the fallow area covers 17 squares fully, 5 square by about 80%, four by about 50% and another four about 20%. To get the total just multiply each and add as so:

$17 \times 1 =$	17	hectares
$5 \times 80\%$	=	4 hectares ($80\% \div 100 \times 5$)
$4 \times 50\%$	=	2 hectares
$4 \times 20\%$	=	<u>0.8</u> hectares

Total 13.8 hectares

Annex 4

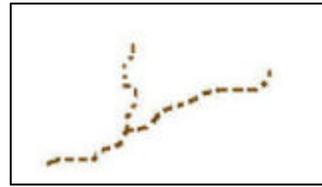
Suggested Legend and Color Coding for Final Land Use Plan Maps⁸

⁸ From Volume V of Guidelines for the Formulation/Revision of Comprehensive Land Use Plan by Rules and Standards Development Group- Housing and Land Use Regulatory Board and those developed during field testing of process

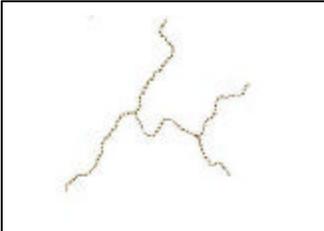
A. Symbols



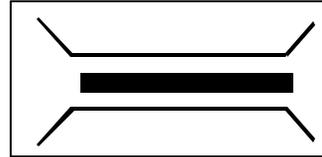
All-weather road



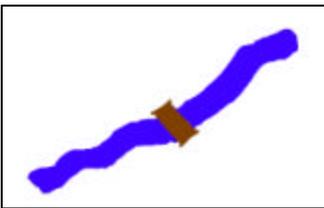
Trails



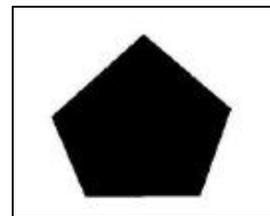
Footpaths



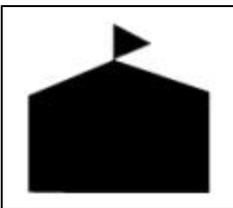
Bridge



Culvert



Purok center



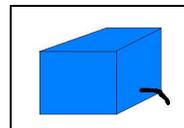
School



Health Center



Multi-purpose Pavement



water reservoir/springbox

B. Color Codes

<u>Land Use Category</u>		<u>Sub-category/Land Cover</u>	
	Built-up areas		Residential
			Commercial
			Institutional
			Parks/playground & other Recreational spaces
	Agricultural		Permanent-pure
			Permanent mixed (fruit trees)
			Permanent-cash crop combination
			Fallow (shrub)
			Fallow/pasture (grassland)
			Forest(ry)
	Second-growth/logged-over		
	Second-growth (Fallow)		
	Timber Plantation		
	Tourism		

Annex 5

Sectoral Standards⁹

⁹ From Volume V of Guidelines for the Formulation/Revision of Comprehensive Land Use Plan by Rules and Standards Development Group- Housing and Land Use Regulatory Board and those developed during field testing of process

1. Standards for Sizes of School Sites

a. Elementary

1 or 2 classes & no grade above Gr.IV (rural school).....	0.5 hectare
6 or more classes (for central school) or 3 to 4 classes (for non-central school).....	1.0 hectare
7 to 9 classes.....	2.0 hectares
10 to 12 classes.....	3.0 hectares
more than 12 classes.....	4.0 hectares

In special cases where there is difficulty in meeting the above standards, the following may be allowed:

For rural areas:

6 or more classes (central school) or 3 to 4 classes (non-central school).....	0.5 hectare
5 to 10 classes.....	1.5 hectares
more than 10 classes.....	3.0 hectares

b. Secondary Schools

Barangay.....	1.0 hectare
General/trade.....	3.0 hectares
Agricultural.....	3.0 hectares campus, 2.0 hectares for freshwater fishponds and/or 2.0 hectares for brackish water fishponds

2. Sports and Recreation

Minimum of 0.5 hectare per 1,000 population for playfield/athletic field

3. Road Network

- a. For national roads in rural areas, the minimum width of road right-of-way shall be 60 meters, however, if the areas are populated the road right-of-way shall be less than 30 meters. Lane varies for each type of surfacing.
- b. For provincial roads, the minimum right-of-way is 15 meters, which may be widened to 20 meters.
- c. All municipal/city roads shall have a right-of-way of 10 meters and the width traveled way is 4.0 meters.
- d. Barangay roads shall have a minimum right-of-way of 10 meters and the width traveled way is 4.0 meters.