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Participatory Land Use Planning for Climate-Smart Villages

GUIDELINES and REFERENCES

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Participatory Land Use Planning for Climate-Smart Villages: Guidelines and References

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FOREWORD

Climate change arguably is one the most pressing challenges of the world today. Its impacts encompass the global biophysical, economic, and socio-political landscapes. In the biophysical landscape, for instance, the quality of land is deteriorating, holding back land-based initiatives that aim to help communities survive the impacts of climate change. It is then imperative for a sound land use planning to be implemented to inform relevant actors, i.e., the communities and their government, of ways on how to utilize available land and water resources.

Top-down approaches, wherein governments and development organizations lead communities in their pursuit of certain goals, are often perceived as external interventions and impositions lacking their active input. Bottom-up, grassroots, and participatory-based approaches were eventually adopted, paving the way for communities to join implementations of activities that are meant to help address their issues. Under such approaches, they are no longer passive end-beneficiaries, but active agents of change who lead their own ways.

In analyzing how to utilize land and water resources in communities, participatory land use planning with climate change adaptation (PLUP-CC) will be implemented in Climate-Smart Villages (CSVs). PLUP-CC is a bottom-up approach in assessing the potentials of land and water resources and finding alternative means to adapt to and mitigate the impacts of climate change. Through the PLUP-CC, the community will be able to identify and practice the best land use options, which will address their issues today and sustain their resources for the next generations.

Implementing PLUP-CC, however, is easier said than done.

The PLUP-CC that will be developed must align with land use plans in the district, regional, and provincial levels. This is to ensure that the PLUP-CC follows the existing policies in the country. Aside from policy-related concerns, it must also define how the communities will participate in the implementation phase. Participation entails a sense of ownership and responsibility. Communities, then, are now considered primary drivers of the success of PLUP-CC.

The Guidelines on Participatory Land Use Planning for Climate-Smart Villages was prepared under the supervision of the CGIAR Research Program on Climate Change, Agriculture and Food Security in Southeast Asia (CCAFS SEA). The writing was led by Chu Thai Hoanh of the International Water Management Institute, with contributions from Bui Tan Yen of CCAFS SEA and Nguyen Hieu Trung of Can Tho University, Vietnam. Participants during the Training Workshop on Participatory Land Use Planning in Climate-Smart Villages held in Bac Lieu, Vietnam from 18-21 August 2015 were also instrumental in finalizing the Guidelines.

We hope that the Guidelines will be helpful in implementing PLUP-CC and, most importantly, in making the communities realize that they are able to withstand the onslaught of climate change.

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Background and Purpose of the Guidelines

Land use planning (LUP) refers to the systematic assessment of land and water potential and of alternatives for land use and economic and social conditions to select and adopt the best land use options. Its purpose is to select and apply those land uses that will best meet the ideas of the people while safeguarding resources for the future (FAO, 1993).

(Participatory) land use planning is an iterative process based on the dialogue amongst all stakeholders aiming at the negotiation and decision for a sustainable form of land use in rural areas as well as initiating and monitoring its implementation (GIZ, 2012).

Participatory Land Use Planning (PLUP) is essentially bottom-up land use planning, carried out with active participation of the concerned community. Under the current and future changes in the climate, PLUP must incorporate possible climate changes (and sea level rise, if relevant) identifying and selecting land use options. Such participatory land use planning under climate change (PLUP-CC) should not only improve the livelihoods of the existing community but also to sustain the resources development of the future generation.

The following are the most important objectives of participating in PLUP-CC:

- identify community development needs and potentials based on the CSV environment under climate change;
- empower the community through democratic representation, involving community members who are relatively powerless in decision making; and
- improve the living conditions of the community and its environment based on the predetermined government goals and objectives.

PLUP-CC is guided by land use objectives. They emanate from understanding the problems and constraints of resources, demands in development,, and requirements in environmental management of the CSV. Participants of PLUP-CC must clearly understand the extents, quantities, and qualities of the land resources such as land types by slope, soil and water conditions, current land and water use, socio-economic situations, farming systems--including crops, livestock and fisheries--rural programs, and specifically current and projected changes in the climate.

In the process of PLUP-CC in Climate-Smart Villages (CSVs), simple techniques, procedures and instruments of planning were considered to improve economic benefits of the land, water resources, infrastructure and social assets of the community. Furthermore, PLUP-CC in CSVs would be effective in identifying support/interventions necessary for materializing a future land use plan.

The key activity in PLUP-CC is to select and map the planning land unit, then identify and discuss extensively the problems in using it under climate change conditions. After this, optional solutions will be identified and decisions will be made on its future use. Land use options should confirm sustainability although it could be flexible based on demands of markets and the community needs.

Land users and local stakeholders play major roles in the PLUP-CC process. Researchers and technical staff in district and provincial agencies provide technical support, and take roles in facilitations, reminding, and advising. The community decides on choices, i.e., what should be produced on a certain land unit. The prerequisites for successful facilitation of 'bottom up' approaches are a good working relationship within the community and a thorough understanding of local conditions.

PLUP-CC is not a one-time exercise of drafting a land-use plan, but instead a continuous process of follow-up, ensured through built-in monitoring and evaluation procedures. Conflicts over land use objectives among different land user groups, as well as uncertainty over future development and climate change, and technology innovations limit the scope of PLUP-CC.

PLUP-CC in CSV is only meaningful if it is coordinated and put into a wider context, i.e., interactively linked with higher land use plans in district, provincial, and regional levels. Matching with these higher land use plans will help the CSV plan to follow policies, laws, regulations, and guidelines pertaining to land use in the country, which include production objectives, environmental protection, and ecosystem services.

Data and information for analysis of land uses and development intervention options will be collected by a participatory team from the planning units' area to arrive on an integrated participatory plan that would be implemented by land users.

Objectives of the Guidelines

The Guidelines on 'how-to-process' PLUP-CC are written for facilitators, i.e., technical staff under commune, district, and provincial authorities, and researchers/advisors who support the PLUP-CC. However, the Guidelines only provide directions and advice. The process should be revised and adjusted to fit in local bio-physical and socio-economic conditions, the institutional structure, and the planning procedure being applied in the country. The PLUP-CC will be repeated whenever the land use plan is revised as requested by national regulations.

The Guidelines assume that information and data on basic demographic, land and water resources, and social-economic conditions are available and can be collected by the planning team. Measurements and surveys to provide these information and data are outside the scope of these Guidelines.

The Guidelines only cover simple tools that are commonly applied in the Participatory Rural Appraisal (PRA) and Rural Rapid Appraisal (RRA). More complex quantitative methods and tools such as optimization modeling or ComMod (companion modeling that combines a role playing game and a model) are not included in the Guidelines because these methods require special training. However, PLUP-CC team can develop and apply them if expertise, budget, and time are available.

Structure of the Guidelines and Overview of Steps

The Guidelines, which are summarized in Figure 1, consist of six steps, each of which comprises a number of sub-steps. The focus of PLUP-CC is on climate-smart adaptation, therefore, after the preparation in Step 1, conventional PLUP (without climate change adaptation) is implemented in Step 2 followed by PLUP-CC in Step 3. After the consultation meetings to develop PLUP-CC are organized at the CSV, the outputs are matched with land use plans, programs, and projects at higher management levels (commune, district, provincial, regional, and national levels). The PLUP-CC process is documented on a report developed in Step 5. A follow-up step (Step 6) is included for monitoring and evaluation of PLUP-CC before starting another round of PLUP-CC.

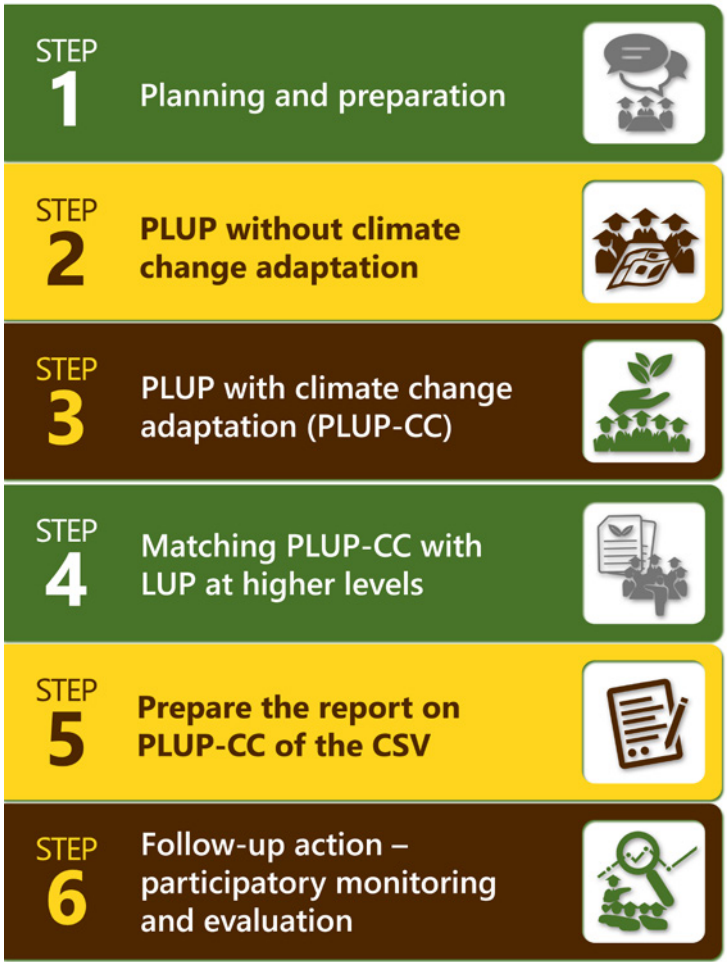

Figure 1: Steps in conducting participatory land use planning

STEP 1: PLANNING AND PREPARATION

1. Formulation of PLUP-CC team and organization
2. Quick revision of PLUP-CC for targeted CSV
3. Preliminary analysis – Land use system definition and boundaries
4. Preparation for consultation meetings at the CSV

1. Purpose: To plan and prepare the consultation meetings and key activities in the process of PLUP-CC.

2. Planning and preparation

2.1) Formulation of PLUP-CC team and organization

A PLUP-CC team must be formulated and organized. The key members of the team are planners from the district and provincial agricultural department (leading institute), members from district and provincial department of natural resources and environment, department of fisheries (and other relevant departments such as construction, planning and investment, depending on institutional structure in the country), and CSV leaders. Researchers and experts from universities, NGOs and national or international research organizations can be facilitators/advisors in the PLUP-CC process.

Once a PLUP-CC team is organized, a team leader is assigned. Among the team members, 1-2 facilitators with 1-2 recorders, who are thought to be capable in taking responsibilities, in particular, speaking and understanding local language and conditions, are selected for each step in the process. The rest of the team assists in information and data collection, prepares materials and facilities for consultation meetings and records the event by using a checklist of PLUP-CC tools that they prepared. They also attend the consultation meetings as a participant to argue, comment, and discuss the subject in each step of the process.

2.2) Quick revision of PLUP-CC for targeted CSV

a. Preliminary identification of planning area

The planning area is delineated by the CSV administrative boundary. However, because natural conditions are important factors in land use, the area could be expanded to a larger extent with natural boundaries based on topography (landscape as valley, hill, and mountain) or hydrological conditions (watershed, irrigation system, etc).
Topographic, hydrological and current land use maps, satellite images, aerial photographs, and other sectoral maps can be used for delineating the planning area.

b. Identifying required information and data

The PLUP-CC relies heavily on secondary data that are needed to be sourced, collected, and organized at the preliminary analysis stage. Table 1 presents a checklist

of information and data required for PLUP-CC. The team has to collect as much as possible, preferably before the consultation meetings in the CSV. Other relevant information and data related to specific features of the CSV should also be collected.

Table 1: Checklist of data to be collected for land use planning

General information
1. Location
2. Elevation
3. Accessibility *(roads, distances)*
4. Relevant infrastructure
5. Administrative division

Climate *(annual, seasonal and monthly distribution, variability and extremes, projection for future climate change)*
1. Rainfall
2. Temperature
3. Wind velocity
4. Potential evapotranspiration
5. Growing period

Soils
1. Relief *(slopes)*
2. Erosion
3. Soil fertility
4. Other soil related limitations

Hydrology
1. Rivers and streams *(water level, relevant water quality as salinity, acidity, discharge)*
2. Groundwater level and quality
3. Variations under climate change and sea level rise *(if relevant)*

Land suitability
1. Suitability for different land uses
2. Land capability
3. Carrying capacity

Actual land uses
1. Agriculture *(major crops, including crop calendar, inputs and outputs)*
2. Livestock
3. Forestry
4. Natural vegetation
5. Other uses

Economy
1. Living standard
2. Sources of income
3. Expenditure pattern
4. Agricultural and livestock production
5. Farming systems
6. Availability of (agricultural) inputs
7. Labor availability
8. Markets
9. Farm size
10. Land security and tenure systems

Sociology/social services
1. Demographics *(population, ethnic, gender, education, skill...)*
2. Land pressure
3. Presence of land-use conflicts
4. Inter- and intra-regional migrations
5. Settlement pattern
6. Housing
7. Status of and services for education and health
8. Other (social) services: shops, water supply, etc.
9. Presence and effectiveness of local institutions
10. Effectiveness of village leadership

Land management related policies, laws, etc.
1. Laws, policies, regulations, etc. concerning land
2. By-laws for land management

Active projects in the area
1. Sectoral projects
2. Integrated projects

Existing land-use plans and development plans
1. Village
2. District
3. Provincial
4. Regional
5. National

The main types of data include:

1. ***Spatial data*** or maps showing topography, elevation, slope, geology, soils, climate, land use, water bodies, rivers, administration boundaries, village locations, roads, etc. Satellite images and aerial photographs are also relevant sources of spatial data. Overlaying the various maps acquired helps identify and delineate the agro-ecosystem zones.
2. ***Statistical village data*** on demographic, economic, social, agricultural, and climatic conditions. Wherever possible, these data should be disaggregated to agro-ecosystem zones and can be reassembled for the zone as a whole, allowing the zone's demographic, socio-economic and agricultural characteristics to be described.
3. ***Village profile***: The village profile (in the Situation Analysis and Needs Assessment Report of CSV) is a valuable source of maps and information that can help characterize the CSV as a whole and its agro-ecosystem zones.

c. Stakeholders identification

As a principle, PLUP-CC will be appropriate if all relevant stakeholders can be identified and they will participate in the process. Key stakeholders are land users who directly use the land and water resources and managers who are supporting and controlling these uses. They can participate by the following modes; however, the better outputs arise from the more active modes (d, e, f):

a. Passive participation: people participate by being told what is going to happen, or has already happened.
b. Participation by information giving: people participate by answering questions and then waiting for what will happen.
c. Participation by consultation: people participate through consultations, during which external people listen to their views; decision making, however, is not shared.
d. Functional participation: people participate by forming groups to meet predetermined objectives.
e. Interactive participation: people participate in joint analysis, leading to action plans and the establishing of new local institutions or the strengthening of existing ones.
f. Self-mobilization: people participate by taking initiatives independent of external institutions to start processes, or to change their situation.

Some guidelines for selecting CSV representatives are presented in Table 2, but the selection also depends on the institutional structure, management system and local culture.

Table 2: Village representation and selection guidelines

Representation	Selection guidelines
Geographic	Ensure key informants are selected from each agro-ecosystem zone in approximately equal proportions.
Gender	Aim for an equal number of men and women, ideally 10 persons for each group.
Ethnic	Ensure that all ethnic minorities living in the commune are represented and that numbers are in proportion to the total population of each ethnic group
Age	Ensure that all age groups are represented in the approximate ratio of 1:3:2, corresponding to young, middle-aged and elderly people, respectively.
Resident period	Ensure that the informant has lived in the commune for a few years – the longer, the better.
Wealth	Select key informants from better-off, medium, poor, and very poor families in approximately equal proportions, but with a slight emphasis on poor representation.
Occupation	Ensure that key informants include farmers, fishers, Non-Timber Forest Product (NTFP) collectors, and others engaged in locally important occupations.
Social standing	Ensure that there is at least some representation from official leaders (village head, etc.), traditional leaders (elders), and key land users (regular farmers, fishers, etc.).

In addition, key representatives should ideally be knowledgeable about the CSV as a whole and in particular about the agroecosystem zone where they live. They should be articulate and able to talk in front of a large group, and finally, they should be well-liked and able to get along with others.

2.3) Preliminary analysis – Land use system definition and boundaries

The CSV boundary is mapped, usually on a medium or large topographic map. Following the initial transect, draft agro-ecosystem boundaries are added along with any other features identified during the initial analysis. These zones are essentially areas of similar land use and agriculture, and where farming systems in each zone have similar problems and agricultural development potential. These zones are usually characterized based on different soils, topography, hydrology and resources. In most cases, three to six distinct zones can be identified in a CSV.

System hierarchy

The system hierarchy comprises the administrative hierarchy from the province down to the CSV as well as the various agro-ecosystem zones and related land uses within the CSV as shown in Figure 2.

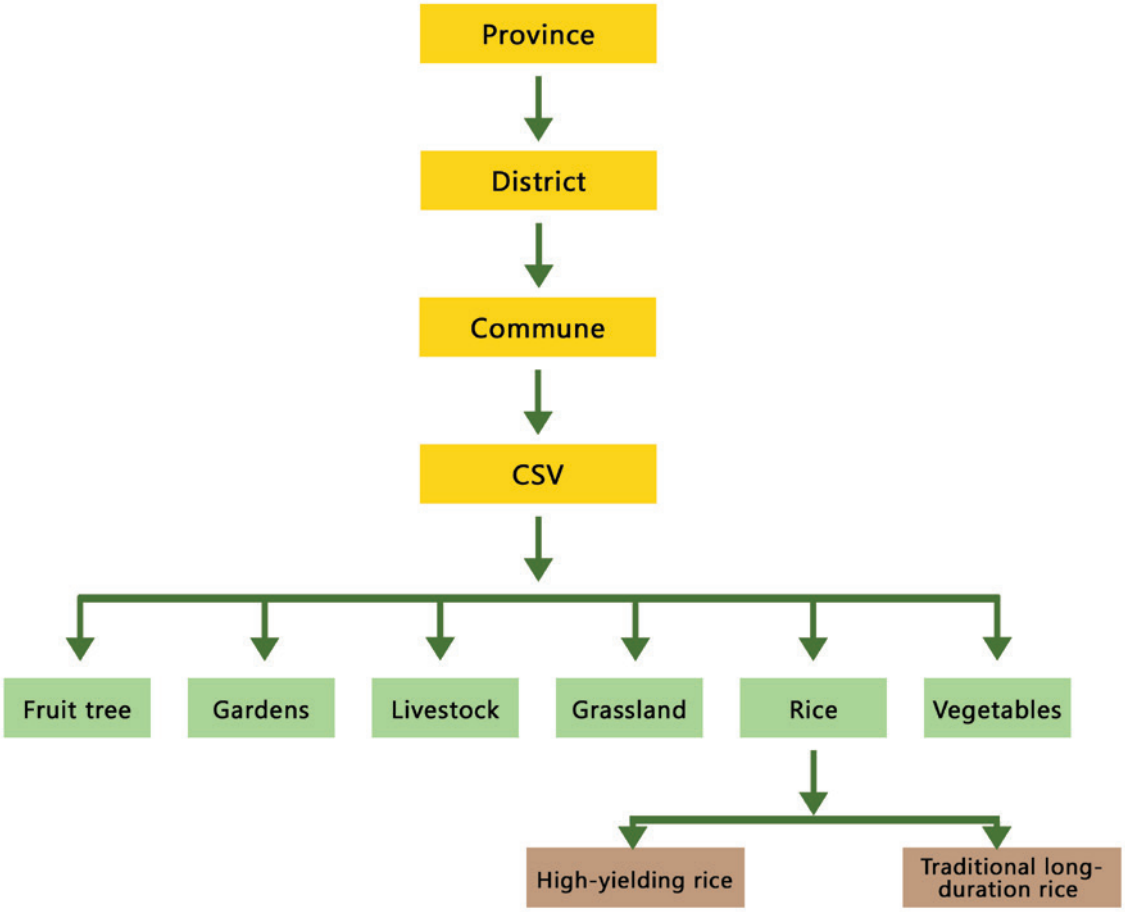

Figure 2: Example of a hierarchy from province to CSV

Climate-smart focus

Climate is the major controlling physical factor in agricultural land use. It is one of the main development factors of relief (topography) and soils. It determines water balance in geo-hydrology and hydrology. Climate also decides the nature and floristic compositions of the natural vegetation of a specific site.

In the Mekong region, the two main climatic factors, which directly govern land use types and cropping calendar, are the rainfall amount and distribution and the air temperature. Thus their monthly variability and future change are also considered as key factors in PLUP-CC. Furthermore, seasonal wind speed variation is a relevant factor on land use in some CSVs.

2.4) Preparation for consultation meetings in the CSV

Materials and facilities

A list of useful items is provided in Table 3.

Table 3: Useful items for consultation meetings

Materials	For participants	For the facilitator
1. Flip chart paper (more than one piece of paper per tool) 2. Filter pens, at least 3 different colors 3. Tape (wide) 4. 'Post-it' sticky notes 5. Prepared materials: development plans, land-use plans, maps…	1. Drinks and snacks 2. Information about the project or associated organizations, if available	1. Notebook and pens 2. Camera 3. Table for listing participant names 4. Print-outs of the tool descriptions

Facilitators

Each focus group discussion is led by one facilitator. The role of the facilitator is to encourage participation within the group to ensure that the ideas and opinions of participants are heard. The facilitator does not need to be an expert on climate change, agriculture or forestry, but has communication and facilitation skills to accelerate the discussion. Facilitators should prepare themselves by 1) familiarizing with the PLUP-CC process and tools; and 2) checking all the materials in the checklist.

Timing

The actual time of application of each tool in the PLUP-CC can vary considerably depending on the make-up of the groups and the experience of the facilitators. It is important to be aware, however, that spending a very long time on one particular tool can slow down progress. The conversation can go in circles, resulting in exhausted or confused participants. Therefore, there should also be a list prioritizing which tools are essential and which can be omitted if there is insufficient time.

STEP 2: PARTICIPATORY LAND USE PLANNING WITHOUT CLIMATE CHANGE ADAPTATION

1. Purpose
2. Process of participatory land use planning without climate change adaptation
3. Brief description of possible methods and tools

1. Purpose: To develop a land use plan of the CSV without climate change adaptation as in conventional procedure.

2. Process of participatory land use planning without climate change adaptation

The PLUP process is mainly based on FAO methods on land evaluation and land use planning (FAO, 1976 and 1993) and the community agro-ecosystem analysis (CAEA, 2011) and consists of five steps (Table 4).

The main outputs of this PLUP process are a table and map of land use plan to present selected LUT in each LU. Different scenarios on development objectives and variations of relevant land use factors (water, demand, market) can be considered.

Objectives, possible tools and milestones of each step are presented in Table 4. However, depending on available information and data, expertise and facilities, as well as other tools and techniques can be applied in each step.

Table 4: Objectives, possible tools and milestones of each step in the PLUP process.

No.	PLUP step	Objectives	Possible methods/ tools	Milestones
1	*Formulation of goals and objectives of land use plan*	Identify goals and objectives of PLUP	Focus group discussion	A list of land use goals and objectives
2	*Preparation of a general base map with agro-ecosystem zones (AEZs)*	Provide a base map of land use plan that CS villagers can work on.	• Maps and Overlays (A1) • Description of participant locations • Water Body Attribute Analysis (A2) • Referring to current land uses	A base map of AEZ

No.	PLUP step	Objectives	Possible methods/ tools	Milestones
3	*Identifying land qualities of land units (LUs) in each AEZ*	Identify land qualities of LUs for land evaluation	• Transect Diagram (A3) • Referring to current land uses	A list of land qualities of LUs in each AEZ
4	*Defining promising land use types (LUTs) in each AEZ*	Provide land use types	• Historical Profile (A5) • Seasonal calendar (A6) • Gender Tasks Analysis (A7) • Gross-Margin Analysis(A10) • Referring to current land uses in the CSV and other villages	A list of promising LUTs with land use requirements
5	*Formulation of LUT options, and selecting preferable and feasible LUT in each LU of all AEZs*	Match land use requirements of LUTs with land qualities of LUs	• Land Tenure (A10) • Market and Value-Chain Analysis(A11) • Wealth Ranking Analysis(A13) • Flow Diagrams(A9) • Pair-wise Ranking Technique(A12) • Land Use System Properties Analysis(A14) • Preparation of Participatory Land Use Plan (A16)	A table and map of LUs with selected LUTs

Notes:
- Goals are general statements of desired outcomes of the community.
- Objectives are more specific and are a subset of goals, providing measurable strategies.
- (A1), (A2)... See tools A1, A2... in Appendix

3. Brief description of possible methods and tools

Table 5: Possible methods and tools for PLUP

No.	Method/tool	Description
1	Focus group discussion (FGD)	A form of group interviewing in which a small group – usually 10 to 12 people – is led by a moderator (interviewer) in a loosely structured discussion of the goals and objectives of land use.
2	A1: Maps and overlays	True-to-scale map layers to provide locations of different parameters, including administrative boundaries, infrastructure, land use, soil types and water resources.
3	A2: Water-body attribute analysis	A table is used to improve understanding of different water resources and capture/analyze information on how they are used.
4	Referring to current land use	Current land use in the base map can be determined by: • Descriptions of land use at various locations by land users in the CSV. • Referring to maps, satellite images or areal photographs.
5	A3: Water resource use analysis	A matrix is used to assess a wide range of water uses and to help identify needs on key water resource development.
6	A4: Transect diagram	A transect diagram is used to describe and compare land use systems in AEZs.
7	A5: Historical Profile	A historical profile is used for a timescale analysis over a longer term and to help identify key sustainability issues.
8	A6: Seasonal Calendar	A seasonal calendar shows the analysis of time-related changes for each land use system in a year.
9	A7: Gender Tasks Analysis	This analysis provides disaggregated information on the proportion of men and women engaged in each land use and livelihood sub-tasks.
10	A8: Land Tenure	This tool shows how landholding varies based on wealth class to understand the landholding patterns and the needs of the poor.
11	A9: Flow Diagrams	A tool is used to analyze the flow of inputs and outputs from one AEZ to another and also up and down the hierarchy.

No.	Method/tool	Description
12	A10: Gross-Margin Analysis	A tool is used to promote a better understanding of local production systems and to help identify where improvements can be made.
13	A11: Market and Value-Chain Analysis	A tool that allows a better understanding of market-related problems and opportunities for important livelihood products.
14	A12: Pair-wise Ranking Technique	A tool is used for objectively ranking issues, problems and solutions, and for prioritizing which ones would be considered first.
15	A13: Wealth Ranking Analysis	A tool illustrates the variations in the poverty levels and equitability issues, and to gain insights into the characteristics, needs and opportunities of each wealth class.
16	A14: Land Use System Properties Analysis	A tool used to describe four properties of land use systems: productivity, stability, sustainability, and equitability.
17	A15: Land and Water Use Strategies	A tool used to combine findings during the PLUP process to identify land and water use strategies for each AEZ.
18	A16: Preparation of Participatory Land Use Plan	A tool to convert land use options to a land use plan for all land units and provide the main outputs, a table and a map of PLUP.

Note: A1, A2... referred to tools A1, A2... in Appendix

STEP 3: PARTICIPATORY LAND USE PLANNING WITH CLIMATE CHANGE ADAPTATION

1. Purpose
2. Process of participatory land use planning without climate change adaptation
3. Brief description of additional methods and tools

1. Purpose: To revise and incorporate climate change adaptation into the land use plan developed in the preceding step.

2. Process of participatory land use planning with climate change adaptation

The process of participatory land use planning with adaptation to climate change (PLUP-CC) and sea level rise (SLR) consists of four steps (Table 6).

Table 6: Objectives, possible tools, and milestones of each step in the PLUP-CC process.

No.	PLUP-CC step	Objectives	Possible methods/tools	Milestones
1	*Identifying CC-SLR issues*	Project CC-SLR issues in the CSV	• Focus group discussion • Referring to existing studies on CC-SLR for the CSV region • Village history and hazard timeline (A17) • List of Exposure to Extreme Weather Events (A18) • Perceptions of Changes in Climate and Weather Patterns (A19) • Strategies for Coping and Adaptation (A20)	A list of projected CC-SLR issues that can influence land use in the CSV
2	*Identifying changes in land qualities of LUs due to CC-SLR*	Identify land qualities of LUs under CC-SLR	• Revising land qualities of LUs by checking the list of projected CC-SLR	A list of new land qualities of LUs under projected CC-SLR
3	*Revising promising land use types (LUTs) to adapt to CC-SLR*	Revised promising LUTs with CC-SLR adaptation	• Seasonal calendar (A6) with CC-SLR adaptation • Gross-Margin Analysis(A10) with CC-SLR adaptation	A list of promising LUTs revised to adapt to CC-SLR

No.	PLUP-CC step	Objectives	Possible methods/tools	Milestones
4	*Revising and selecting LUT in each LU to adapt to CC-SLR*	Match land use requirements of LUTs with land qualities of LUs under CC-SLR impacts	• Pair-wise Ranking Technique(A12) with CC-SLR adaptation • Land Use System Properties Analysis(A14) with CC-SLR adaptation • Preparation of Participatory Land Use Plan (A16) with CC-SLR adaptation	A table and map of LUs with selected LUTs to adapt to CC-SLR

3. Brief description of possible methods and tools

Aside from the possible methods and tools listed in Table 5 for PLUP, additional methods and tools to project CC-SLR and adaptation for PLUP-CC are listed in Table 7.

Table 7: Additional methods and tools for PLUP-CC

No.	Method/tool	Description
1	A17: Village history and hazard timeline	A timeline to show the history of the village as well as the most significant natural hazards and disasters.
2	A18: List of Exposure to Extreme Weather Events	A list that shows exposures to extreme weather events and when they most commonly occur.
3	A19: Perceptions of Changes in Climate and Weather Patterns	A systematic analysis of participants' perceptions on changes in climate and weather patterns.
4	A20: Strategies for Coping and Adaptation	A tool to document the strategies for limiting impacts before, during, and after an extreme event, as well as highlighting possibilities for reducing future vulnerability.

STEP 4: MATCHING PLUP-CC WITH LAND USE PLANS AT HIGHER LEVELS

1. Purpose
2. Process of matching PLUP-CC output of the CSV with land use plans at higher levels
3. Brief description of possible methods/tools

1. Purpose

To match the PLUP-CC output of the CSV with land use plans and policies at higher management levels i.e., the commune, district, province, regional and national levels (Figure 3).

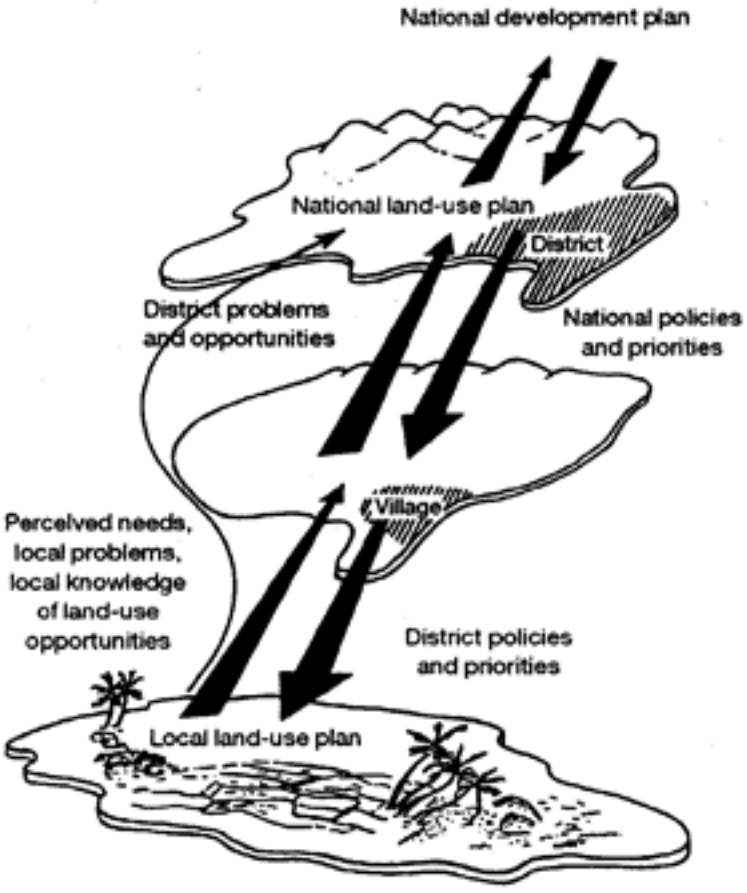

Figure 3: Integration of land use plans and policies on different management levels (source: RLAUD, 2012)

2. Process of matching PLUP-CC with land use plans in higher levels

1) Check which plans, programs and projects can potentially influence land use in the CSV.

2) Organize a consultation meeting with planners and managers in the higher management levels who are involved in those plans, programs and projects and are highly influential in land use in the CSV. They will present the PLUP-CC output in the CSV to:

   • identify any conflicting objectives, land use systems, and interventions; and
   • discuss possible revisions of both PLUP-CC output of the CSV and plans, programs or projects in the higher levels to minimize such conflicts.

3) Finalize the PLUP-CC output of the CSV through consultation meetings with villagers, planners and managers in the higher management level.

3. Brief description of possible methods and tools

The Venn Diagram (A21 in Appendix) can be used to analyze relationships between local communities and those projects and agencies providing them with support. It is useful in identifying potential development partners or detecting where interagency cooperation could be improved.

STEP 5: PREPARATION OF PLUP-CC REPORT FOR THE CSV

1. Purpose
2. Outline of PLUP-CC report

1. Purpose: After the previous steps, a report should be prepared to provide a basic document that describes the PLUP-CC process applied in the CSV, presents the main outputs of this process and records all related events for reference in the future rounds of PLUP-CC.

2. Outline of PLUP-CC report

This is the proposed outline of the PLUP-CC report:

1. Introduction

2. Main characteristics of the CSV and current land and water use systems

3. PLUP without climate change adaptation
- a. Process of PLUP
- b. Methods and tools for and milestones from each step
- c. Main outputs of PLUP

4. PLUP-CC with climate change adaptation
- a. Process of PLUP-CC
- b. Methods and tools for and milestones from each step
- c. Main outputs of PLUP-CC

5. Matching PLUP-CC with plans, programs and projects in higher management levels
- a. Brief description of plans, programs and projects in higher management levels
- b. Conflicts between PLUP-CC and plans, programs and projects in higher management levels
- c. Solutions for minimizing such conflicts

6. Conclusions and recommendations
- a. Conclusions on PLUP-CC process of the CSV
- b. Conclusions on PLUP-CC outputs of the CSV
- c. Recommendations for the follow-up activities.

STEP 6: FOLLOW-UP ACTION, PARTICIPATORY MONITORING AND EVALUATION

This step is not implemented in the PLUP-CC process presented in the Guidelines, but it is important for future rounds of PLUP-CC in the CSV.

The implementation of PLUP-CC plan depends on how it can be matched into the plans, programs, and projects in higher management levels, and also policies, regulations and institutional arrangements in the country.

However, the villagers can start immediately the land use changes and interventions recommended in the PLUP-CC, which do not require significant support or approvals from higher management levels.

In any case, it would be useful if participatory monitoring and evaluation will be implemented after the PLUP-CC process is completed. This is to provide relevant information and assessment so that villagers can revise and adjust their land use to adapt to the CC-SLR in due time. The participatory monitoring and evaluation can be conducted by the villagers themselves by applying some methods and tools that they became familiar with during the PLUP-CC process.

REFERENCES

Methods and tools in the following references are adopted and modified for the purpose of participatory land use planning and are presented in Appendices A1 to A21.

CAEA, 2011. Commune Agro-ecosystem Analysis in Cambodia: A Guidance Manual. A joint publication of the Department of Agriculture Extension, General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Cambodia and the CGIAR Challenge Program on Water and Food, Colombo, Sri Lanka.

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APPENDIX 1:
TOOLS FOR PARTICIPATORY LAND USE PLANNING WITH CLIMATE CHANGE ADAPTATION

A1: Maps and Overlays
(source: modified from CAEA, 2011)

True-to-scale map layers should be produced for several different parameters, including administrative boundaries, infrastructure, current land use, soil types and water resources. All maps should be of the same scale and should ideally be produced on transparency sheets so that they can be overlaid to analyze spatial relationships and to help identify the AEZs.

Where computer facilities with GIS are not available, hard copies of maps can be produced using transparency sheets or tracings over hard copies of topographic maps or aerial photographs. If no suitable base maps are available, sketch maps can be drawn by hand. These should be as close as possible to scale, but should concentrate more on identifying the main features of the commune than focusing on absolute spatial accuracy.

Key Steps

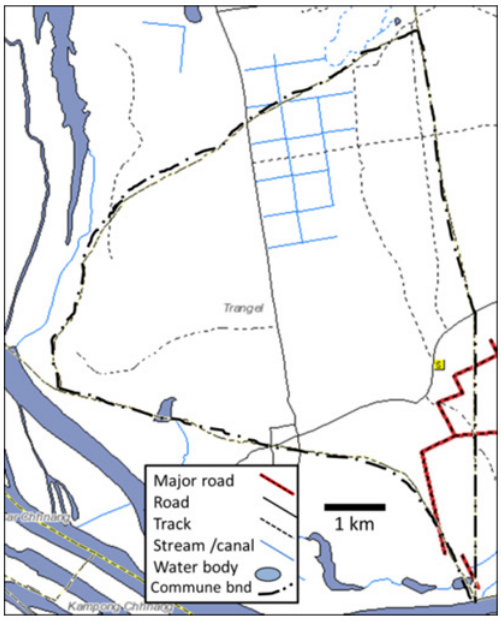
1. Obtain copies of all available maps from provincial/district offices during the secondary data collection.
2. Overlay each map with the others, draft what appear to be distinct land units (LUs), and give them identification codes.
3. Continually refine the maps and the draft AEZs as new information is obtained throughout the PLUP process.
4. Use the draft maps with the villagers to verify their accuracy and to gather additional spatial information for the CSV. For example, areas with similar or different conditions with the land of participants can be identified during consultation meetings.

Checklist

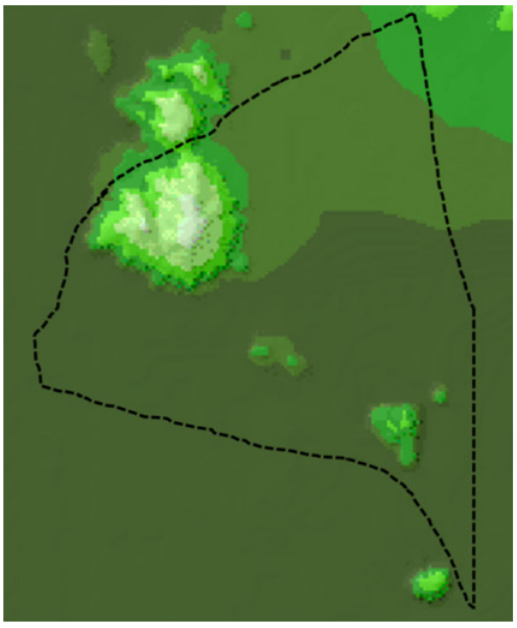
Commune maps should be produced with the following:

- Administrative boundaries.
- Village locations, roads, and government services.
- Rivers, streams and other important water resources.
- Irrigation systems (functioning systems and those in disrepair).
- Hydrology and flood regimes.
- Soil types and geology.
- Land use and natural resources.
- Any other relevant factors.

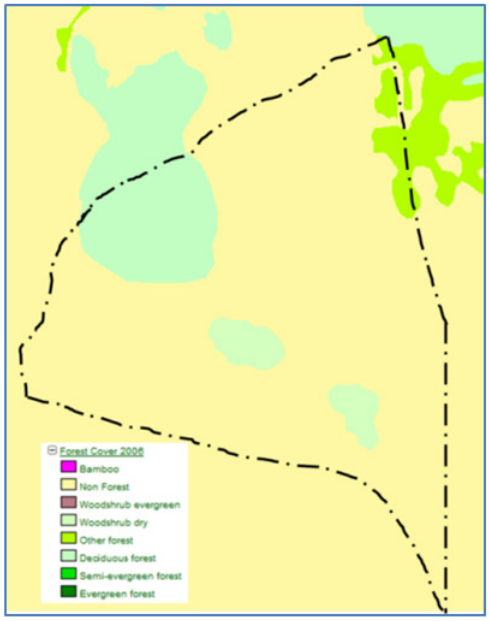
A selection of sample maps and the agroecosystem zones from the map overlay analysis are presented below in Figure A1.



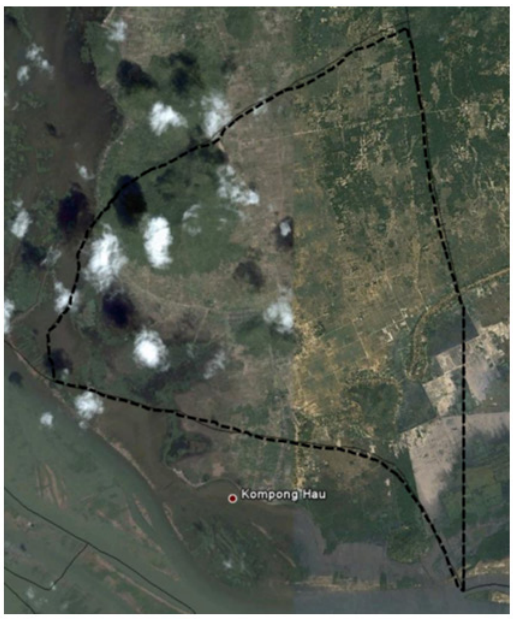
a. Roads and water bodies



b. Elevation



c. Forest cover (2006)



d. Satellite image (source: Google Earth)

Figure A1: Examples of maps used for spatial analysis (Trangei commune, Kampong Chhnang province, Cambodia – in CAEA, 2011)

Figure A2: Example of a CSV map on paper sheet for the PLUP of Ma CSV, Yen Bai Province, Vietnam

A2: Water-Body Attribute Analysis
(source: modified from CAEA, 2011)

The Water-Body Attribute Analysis Matrix is used to improve the understanding on different water resources in the CSV and to capture and analyze information on how they are used. An example of tool outputs is provided in Table A2.

Key Steps

1. Use the water resource map layer to identify all important water sources in the CSV and list them in the first row across the top of the matrix.
2. Use the matrix with key respondents to record all the key characteristics of each water source.
3. Compare levels of production provided by different water bodies and identify the reasons for any differences.

Checklist

Water body types to be analyzed by this tool should include:

- Rivers, perennial streams, seasonal creeks, reservoirs, lakes, aquaculture ponds, trap ponds, swamps, canals, rice paddies, etc

Attributes of water bodies should include the following:

- Agroecosystem zones where the water body occurs
- Seasonality (seasonal or permanent)
- Connectivity (with other water bodies)
- Key water use conflicts
- Water use regulations
- Key environmental concerns/risks
- Use of water body by women
- Use of water body by men

Table A2: Example of water-body attribute analysis matrix in Cambodia

Water body / Attribute	Streams (*Ou*)	Lakes (*Boeung*)	Canals (*Pralai*)	Deep-pools (*Ang Loong*)
Agroecosystem zone where water body is located	Mountain, upland, middle/ lower terrace and floodplain	Floodplain and middle terrace zones	Upland, middle terrace, and lower terrace zones	Mountain zone
Seasonality (seasonal or permanent)	Mountain zone all-year-round. Other zones seasonal	Floodplain: all-year-round. Middle terrace water in dry season	Wet-season water only	All-year-round water
Connectivity (with other water bodies)	Connected to deep pools, Tonle Sap, canals and rice paddies in the wet season	Flood plain *boeungs* connected to Tonle Sap Middle terrace *boeungs* connected to streams and rice paddies during peak rainfall	Connected to streams, Tonle Sap, and paddy fields during the wet season	Connected to streams, canals, rice paddies and the Tonle Sap in the wet season
Key water use conflict	Water use for agricultural upstream reduces downstream water availability	Retting (soaking) palm leaves for roof thatch conflicts with fishing activities	Upstream use of canal water for agriculture reduces downstream water availability	None
Water use regulations	No rules for irrigation water use Have rules on fishing but not always followed	No rules for irrigation water use Have rules for fishing, but not properly enforced	No regulations for use of water on agriculture or fisheries	None
Environmental concerns and risks	Use of natural poisons for fishing Use of electricity for fishing	Retting (soaking) palm leaves for roof thatch deoxygenates water Impacts of illegal fishing on fish populations	Infiltration of chemical fertilizers Pollution by laundry detergents Electrical fishing is reducing fish stocks	Use of natural poison (from tree bark) and electricity for fishing reducing fish population sustainability
Use of water body by women	Home garden irrigation, cooking water, drinking	Fishing, retting (soaking) palm leaves for roof thatch	Fishing, drinking, washing clothes, bathing, cooking	Fishing, drinking, clothes-washing, bathing, cooking
Use of water body by men	Fishing, irrigation (wet season), cattle-raising	Fishing, cattle-tending, washing (when away at night).	Fishing	None

A3: Water Resource Use Analysis
(Source: modified from CAEA, 2011)

Water is used by people for many different but often conflicting purposes such as irrigation, fishing, cattle, conservation, recreation, transport, drinking, and domestic uses. A Water Resource Use Matrix is used to assess this wide range of water uses and to identify key water resource development needs. Examples of outputs from this tool are presented in Table A3.

Key Steps

1. Identify all important water sources in the CSV (first row of the matrix).
2. Record various uses of each water source in both dry and wet seasons.
3. Cross-check with the water resource map and Water-Body Attribute Analysis (see A2).
4. Assess how the different water sources are used in the different seasons and identify any constraints on water availability that may occur during certain periods.

Checklist

Water resources that should be covered in the analysis include:

- All surface water bodies
- Groundwater resources (wells, pumps, bores)
- Rainwater tanks or reservoirs
- Other water sources used for domestic supply (such as piped water, tanks, bottled water).

Table A3: Water resource use matrix for wet and dry seasons

Water resource:	Streams	Reservoirs	Ponds	Rivers	Lakes	Other[a]
Wet season (June–November)						
Water use						
Cooking/Drinking	+	+		++		+
Washing/Bathing	+	+	++			+
Irrigation	++	+				++
Watering livestock		+++		++	+	
Home gardens	++		++	+		
Fishing		++				+
Others (specify)		++		+++	+	
Water resource characteristics						
Water quantity	+++					
Water quality	+++					
Reliability			+++	++	++	+
Equitable access		+		+		+
Dry season (December-May)						
Water use						
Cooking/ drinking	+	+		++		+++
Washing/bathing	+	+	++		+++	+
Irrigation	++	+				
Watering livestock		++			+	
Home gardens	++		+			
Fishing		++				+
Others (specify)		++				
Water resource characteristics						
Water quantity	+++					
Water quality		++				++
Reliability		++				++
Equitable access	+	+++	++	++	+	++
Rank water sources by important level to land use (5 = most important)[b]						

LEGEND
Water use: +++ = Important source ++ = Significant source
+ = Marginal source: 0 = Unused
Characteristics: +++ = Very good ++ = Good + = Marginal 0 = Poor

[a] **Please specify any other resource used.**
[b] **The answer is expected to include the river, which is the most important water resource as it is close to the village; however, there is a lack of water from March to May.**

A4: Transect Diagram
(Source: modified from CAEA, 2011)

A transect diagram is used to describe and compare land use systems in AEZs.

Key Steps

1. Develop a transect diagram to define all parameters included in the checklist (Figure A4).
2. Use the transect diagram to identify important problems and opportunities in land use (Table A4). The discussions also cover the advantages and disadvantages of current land use, opportunities, and rooms for improvement.
3. Continually expand, revise, and refine the transect diagram during the PLUP process as new information comes to light.
4. Summarize important findings to assess how the different land and water sources are used during different seasons.

Checklist

- Representative photograph and a general description of each AEZ.
- Land cover, topography, geology/soils, hydrology, water bodies and irrigation schemes.
- Natural ecology, wildlife.
- Wet- and dry-season land use in crops, livestock and fisheries, among others.
- Major sources of income and nutrition
- Problems, opportunities, and key issues

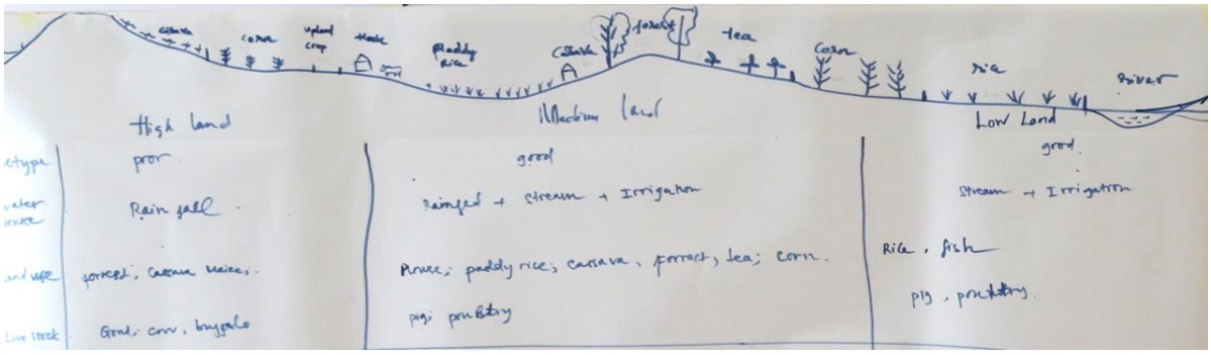


Figure A4: Sample transect diagram of Ma CSV, Yen Bai Province, Vietnam

Table A4: Example of a transect diagram of Sna Ansar Commune, Pursat Province, Cambodia

AEZ	Lowland wet-season rice near lakes and streams	Lowland wet-season rice near residential areas	Seasonally flooded open grasslands with no paddy bunds
Photo-graph			
Soil Type	• Sandy mixed soil • Black soil near lakes and streams	Sandy mixed soil	Black soil
Hydrology	Seasonally inundated land from July to November	Seasonally inundated land from August to November	Seasonally flooded land from June to December
Water Sources	Rainfed with some irrigation	Rainfed	River flood and rainfed
Crops	Wet-season rice Some small areas of dry-season rice Grassland.	Wet-season rice Some fruit trees and upland crops (in and around villages)	Small area of wet season rice (near flooded zone) Some attempts for dry-season rice. Open grassland (no paddy bunds)
Livestock	Cows, buffalo, pigs (mainly breeding sows), chickens and ducks	Cows, buffalo, fattening pigs, chickens and ducks	Cows, buffalo (rangeland)
Land Use	• Lowland wet-season rice • Grazing land (cattle/ buffalo) • Natural fishing • Early irrigated rice in May and/or dry-season rice from December to March/April	• Lowland wet-season rice • Village land, fruit trees and mixed crops.	• Open grassland, grazing buffalo (most) and cattle (a few) • Natural fishing

AEZ	Lowland wet-season rice near lakes and streams	Lowland wet-season rice near residential areas	Seasonally flooded open grasslands with no paddy bunds
Problems	• Illegal fishing in lakes and streams • Lack of water (shallow water in lakes and streams during the dry season)	• Poor soil fertility • Cattle diseases (foot-and-mouth disease) • Insect damage to traditional rice crop - stem borers • Rat damage in wet-season crops	• Illegal fishing • Acid-sulphate soils • Cattle disease – foot-and-mouth disease
Oppor-tunities	• Mat weaving • Using bamboo for construction, handicraft dry-season rice where permanent water is available • Green manure crops or other legumes prior to, or following, the wet-season rice crop to improve soil fertility	• Mat weaving after transplanting rice • Using bamboo for construction and handicraft • Fish raising in ponds • Green manure crops or other legumes prior to, or following, the wet-season rice crop to improve soil fertility	• Fishing from lakes or rivers • Improved pastures for cattle production

A5: Historical Profile
(Source: modified from CAEA, 2011)

A historical profile (example in Table A5) is used for a timescale analysis over a longer term to identify key sustainability issues. In PLUP, the profile focuses on previous significant land use changes in the CSV, time and reason for their occurrence, and the results of these changes--better or worse--to land user livelihoods. The historical profile will help, first, to identify longer-term trends, such as changes in forest cover, in rice yields, in livelihood systems, etc; and second, to assess the resilience of the agroecosystem against major events, such as floods, droughts, pest outbreaks, market-price fluctuations, etc.

Key Steps

1. Use the historical profile template (see example in Table A5) with key informants to record changes in important parameters over time. Preferably one elderly person participates in this exercise.
2. Review the timeline to identify any long-term trends, such as changes in demography, rice yields, soil condition, forest cover, land use, fish populations, etc., and, with the key informants, explore the causes of these changes.
3. Analyze the impacts and responses of the local communities to these trends and record the results in the last two columns.
4. Summarize the most important findings to assess how the different land and water resources are used in the different seasons and identify any constraints that may occur during certain periods.

Checklist

The following issues should be explored with the villagers' historical profile analysis.

- Demographic changes and trends
- Political changes
- Changes in access, communications and services
- Land use changes and trends
- Changes and trends in livelihood activities
- Changes in NTFP abundance
- Changes in land tenure systems and landholding size
- Changes in agricultural practices
- Trends in rice yields
- Trends in soil fertility
- Changes in climate (rainfall, drought, flooding, etc.)
- Changes in hydrology (river, stream, lake and paddy field water-quality and quantity
- Changes and trends in fish stocks (production, species mix and local extinctions)
- Changes in fishing patterns (sites, access, people who fish, gear/techniques, laws and regulations, aquaculture, etc.)

Table A5: Historical Profile: Sna Ansar Commune, Pursat Province, Cambodia

Politics	1970 - 1975	1975 - 1979	1979 - 1990	1990 - 1993	1993 - 1998	1998 - 2003	2003 - 2009
	Lon Nol	Pol Pot	Vietnam invasion	UNTAC	Elected government		
Environment	Negligible Environmental Impact			Impacts begin		Large impacts	
Periods	Pre 1979		1979 - 1990	1990 - 1998		1998 - 2009	
Demographic changes	• Fishers richer than farmers • 200 families in floating village		• Rapid population increase after 1986	• Population growth continues to accelerate		• People from floating village begin to migrate to upland zone	
Political and administrative changes	• Commune office sited in Sna Ansar Village • Sna Ansar and Ou Sandan in one commune		• Vietnamese occupation • Khmer Rouge insurgency in mountain and floodplain zones	• UNTAC period • First national elections in 1992 • Political stability after 1997 coup		• Commune Councils elected by popular vote. • DandD • Institutionalized in RGC processes	
Changes in access, communications and government services	• All selling and buying in commune market • Fish market opens in the early 1960s • Airfield operating		• Commune market closed initially and then reopened	• Access/communications improve dramatically		• National Road No. 5 upgraded	
Land use changes	• Pristine forest • Land tax $1-1.75/ha.		• Paddy rice, deepwater rice and home gardens • Dry season rice begins	• Forest encroachment begins • Some dry season rice		• 40-50% reduction in flooded forest • Dry season rice area reduced • Land grabbing in the upland zone	

Changes in NTFPs abundance	• Wildlife plentiful	• Uncontrolled hunting begins	• Hunting pressure intensifies	• Availability of important NTFPs declines significantly
Changes in livelihood activities	• Main occupations are wet season rice and fishing	• Shared labor	• Farming by individual families	• Rice cultivation, decline in fishing, and increase in off-farm work
Changes in land tenure systems and landholding size	• Private ownership until Pol Pot regime	• Group landholding 3-4 ha for 15 families • Land distributed to families in 1985	• Landholding sizes reduced	• Land encroachment in the upland zone
Changes in agricultural practices	• Used compost only • Good natural fertility • Provincial veterinary service	• No chemical fertilizer use • Good soil fertility	• Use chemical fertilizer • Soil fertility starts to decline • Livestock numbers increase	• Fertilizer use increases year by year. • Pesticide use begins • Even more livestock
Change in rice yields	• Rice yields 2.4-3 T/ha • > 90% of families self-sufficient in rice	• Rice yields 2 T/ha	• Rice yields 1.5-2 T/ha	• Rice yields < 1 T/ha • Most families are deficient in rice
Changes in climate	• Rainfall plentiful and regular			
Hydrology: river, lake, stream water quality and quantity	• Two dams on creeks • *Boeung* holds water all year.	• Dams on creeks rehabilitated and repaired	• Dams still used • Siltation of streams and canal begins	• Dry season rice damaged by floods at harvest time. • Deepwater rice damaged by earlier rapid rise in Tonle Sap water levels

Change in fish stocks (production, species mix, local extinctions)	• Catch <20 kg fish/day • Many species caught	• Catch <15 kg fish/day	• Fish catch <10 kg/day. • Fish extinctions begin • 40% decrease in stocks	• More local extinctions of fish species • 70% decrease in stocks
Fishing changes: sites, access, people, gear, laws, etc.	• Fishing in groups (10-15 persons) • Homemade fishing gear • Gill nets introduced in the late 1960s	• Fishing in groups	• Cage culture introduced • Aquaculture begins • Illegal fishing begins	• Small-scale fishing declines • Large-scale fishing starts to dominate • Aquaculture increases

A6: Seasonal Calendar
(Source: modified from CAEA, 2011)

Table A6 gives an example of a seasonal calendar showing the analysis of time-related changes on each land use system in a year. Such a calendar is valuable to understand for understanding the issues related to stability of the land use system but it should not be too detailed.

Key Steps

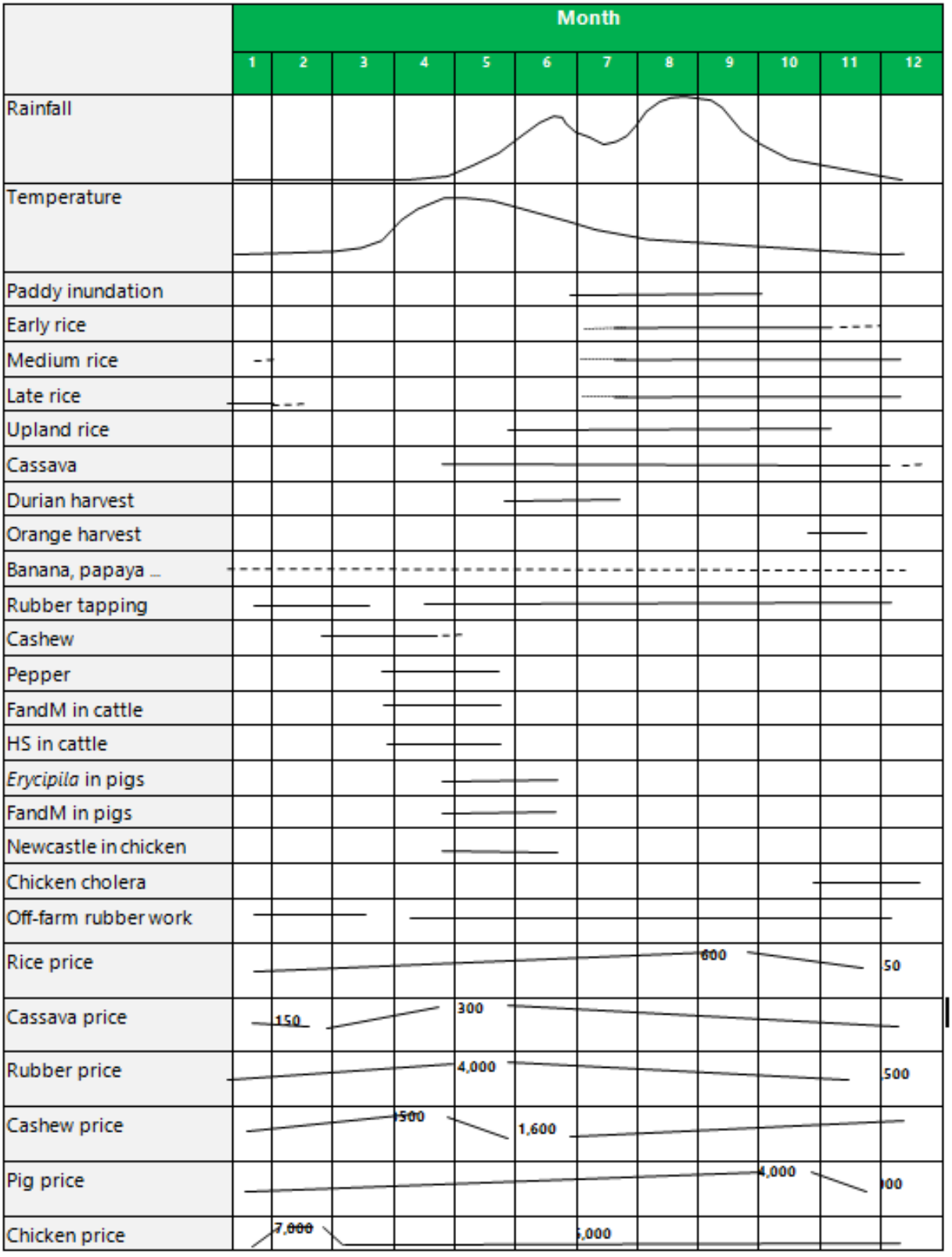
1. Construct and complete a seasonal calendar with the villagers following the example in Table A6. The seasonal calendar should not cover more than two flip-chart sheets.
2. Use the seasonal calendar to discuss the temporal relationships within the livelihood systems of the villagers.
3. Summarize the most important findings to brainstorm how changes in the timing of livelihood activities or farming practices can be used to increase yields, obtain better prices, improve family cash flow, reduce risk from economic events, overcome bottlenecks in labor, etc.

In Step 3 of PLUP-CC, this seasonal calendar is revised with the projected CC-SLR based on higher temperature variation, early or late rainfall or inundation, and salinity by SLR. Climate-dry, normal, and wet years are possibly considered when using this tool for PLUP-CC to identify adaptation strategies in land and water use.
Checklist

The seasonal calendar should cover the following factors:

- Climatic (rainfall and temperature)
- Hydrology (flood period, paddy inundation, risk of drought, groundwater)
- Rice crops (early, medium, late, upland, deep-water, dry season, recession)
- Field crops and vegetables (major crops only – maximum of three)
- Fruit tree crops (only for major fruit crops – maximum of three)
- Livestock (disease incidence, feed shortages, etc., of cattle, pigs and chickens – maximum three lines)
- Fishing patterns (sites, gear used, spawning times, key migration peaks)
- Off-farm migration and work patterns
- Family cash flow showing dominant contributor to income over the year
- Annual price movements (rice, major crops, livestock and fish)

Table A6: Seasonal calendar for major farming activities, Choum Kraviang Commune, Kampong Cham Province, Cambodia



Note. The following symbols should be used in seasonal calendars:

- ..... Crop nursery operations
- ——— Crop growth, care and maintenance
- - - - - Post harvest operations

A7: Gender Tasks Analysis
(Source: modified from CAEA, 2011)

The Gender Tasks Analysis provides disaggregated information on the proportion of men and women engaged in each land use and livelihood sub-tasks. It also helps to better understand both the positive and negative impacts of land use plan on gender. A suggested data collection format is shown in Table A7-2.

Key Steps

1. Use the checklist for the gender task analysis (Table A7-1) to identify the most important livelihood activities, and add more activities, if needed.
2. List these activities in the left hand column of the gender task analysis table (Table A7-2)
3. Discuss the role of women and men in each livelihood activity and record percentage of effort for each activity.

Checklist

Table A7-1: Gender task analysis checklist

Task	Task
Wet-season rice activities	*Other livelihood activities*
1. Nursery land preparation	19. Home garden
2. Sowing nursery	20. Upland cash crops
3. Pulling seedlings	21. Pig raising
4. Transport seedlings	22. Cattle raising
5. Land preparation	23. Poultry raising
6. Planting/transplanting	24. NTFP collection
7. Fertilizing	25. Firewood collection
8. Water control	26. Charcoal
9. Weeding	27. Sericulture
10. Harvesting	28. Water collection
11. Transportation	29. Maintenance of the irrigation system
12. Threshing	
13. Storage	*Economic activities*
	30. Selling agricultural products
Fishing activities	31. Obtaining/paying back loans
14. Fishing (income and consumption)	32. Trading
15. Marketing	33. Household expenses
16. Processing	
17. Preparation for home consumption	
18. Making fishing gear	

Table A7-2: Task analysis by gender - Sample data format

Activity	Men	Women	Additional observations
Wet-season rice activities			
1. Nursery preparation	100%		
2. Sowing nursery	50%	50%	Women soak seeds, men assist in sowing seed
3. Pulling seedlings		100%	
4. Transport seedlings	100%		Women sometimes assist if field is near the village
5. Land preparation	100%		
6. Planting/ transplanting	30%	70%	Transplanted rice will increase after irrigation
7. Fertilizing	90%	10%	Fertilizer use is likely to increase
8. Water control	100%		Water control will be easier with irrigation
9. Weeding		100%	Weed burden is likely to decrease with irrigation
10. Harvesting	20%	80%	Yields will increase with irrigation (more workload)
11. Transportation	100%		Yields will increase with irrigation (more workload)
12. Threshing	90%	10%	Fee of mechanical threshing is 4% of threshed rice
13. Storage	20%	80%	
Fishing activities			
14. Fishing for income	90%	10%	Only female household head are directly involved in fishing for income. Other women are mostly involved in fish processing and sale, or fish cooking
15. Fishing for family consumption	90%	10%	
16. Fish sales	10%	90%	
17. Fish processing	10%	90%	Men also do fish processing at the fishing sites where women are not present
18. Cooking fish		100%	
Aquaculture			
19. Preparing place	90%	10%	Women just take part in light works
20. Find fingerlings	90%	10%	Women could take the leading role in small-scale low input aquaculture
21. Feeding and caretaking	50%	50%	Not heavy work
Other key livelihood activities			
22. Home-garden		100%	Only a few households grow vegetable
23. Upland cash crops	50%	50%	Mainly the poor and medium wealth classes
24. Pig raising	10%	90%	Larger scale (>5 pigs) is usually managed by men
25. Cattle raising	100%		
26. Poultry raising		100%	
27. NTFP collection	40%	60%	Some items are gender-specific
28. Firewood collection	40%	60%	This activity is dramatically decreasing because of fuel and electric availability
29. Sericulture		100%	38 families are growing mulberry trees
30. Charcoal	80%	20%	Seven charcoal production sites around AEZ 1
31. Marketing and selling	10%	90%	This is still considered a "woman's" job
32. Trading	10%	90%	
33. Water collection	20%	80%	
34. Maintenance of the irrigation system	100%		

A8: Land Tenure
(Source: modified from CAEA, 2011)

In many cases, the total landholding varies with wealth class. For historical reasons, it is often the better-off who own the most productive land (better soils, irrigation, good drainage, easy access, etc.). It is important to understand such landholding patterns so that the needs of the poor can be fully addressed in the resulting development plans. An example of landholding is presented in Table A8.

Table A8: Example of land holding data

Land holding	Upland zone (ha)	Irrigated low-land zone (ha)	Non-irrigated lowland zone (ha)	Total area (ha)
Better-off	1	2	1	4
Medium	0.5	1	0.5	2
Poor	0.5	0	0	0.5

Presentation of the data for analysis and reporting purposes should be visual wherever possible, and in a format best suited to drawing pertinent and correct conclusions. Figure A8 shows a suggested presentation format.

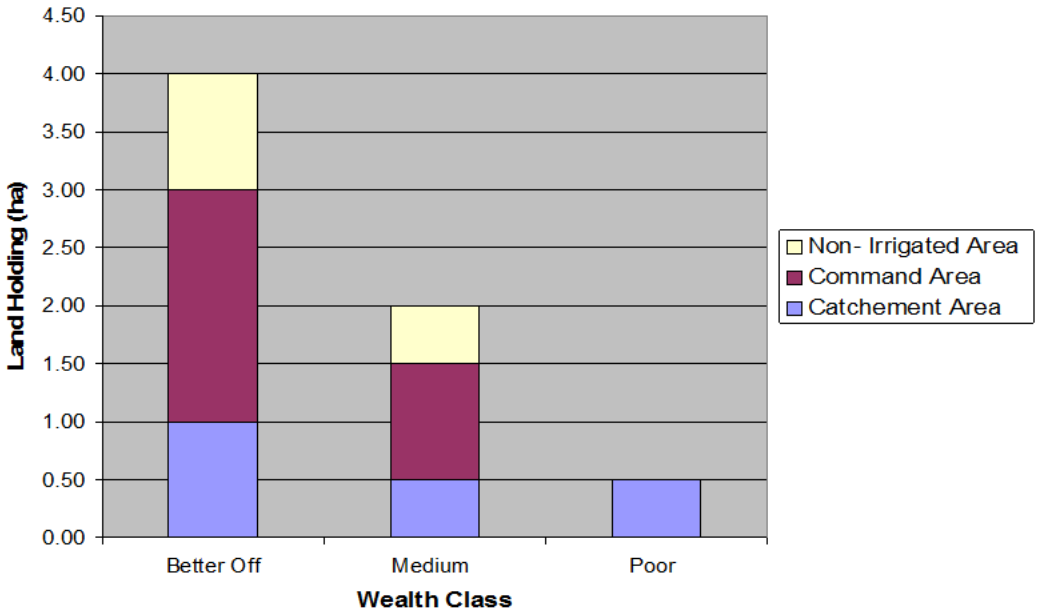


Figure A8: Sample presentation format for landholding type by wealth class

A9: Flow Diagrams
(Source: modified from CAEA, 2011)

Flow diagrams are used to analyze the flow of inputs, money, information, labor, etc. Flows occur from one AEZ to another (e.g. migration of grazing cattle from zone to zone in different seasons) and also up and down the hierarchy (e.g. between village, commune, district and province). Figures A9-1 and A9-2 present the general structure of flow diagram and an example.

Key Steps:

1. Construct a diagram to display flows among the AEZs as shown in Figure A9-.
2. Record up and down flows in the hierarchy and also from zone to zone, using the checklist to ensure comprehensive coverage.
3. Summarize key findings and identify constraints, problems, or missed opportunities related to flows.

Checklist

- Flows of agricultural inputs (fertilizer, pesticides, feed, fingerlings, medicines, etc.) and agricultural machinery (tractors, combines, implements, fishing gear, etc.)
- Farm produce (crops, livestock, fish, NTFPs)
- Agricultural information (techniques, prices, inputs, etc.)
- Seasonal migration (women and men) and labor flows (on-farm and off-farm)
- Credit (formal and informal)
- Livestock movements (grazing, refuge, sales)
- Fish migration, breeding and refuge
- Others (as locally important)

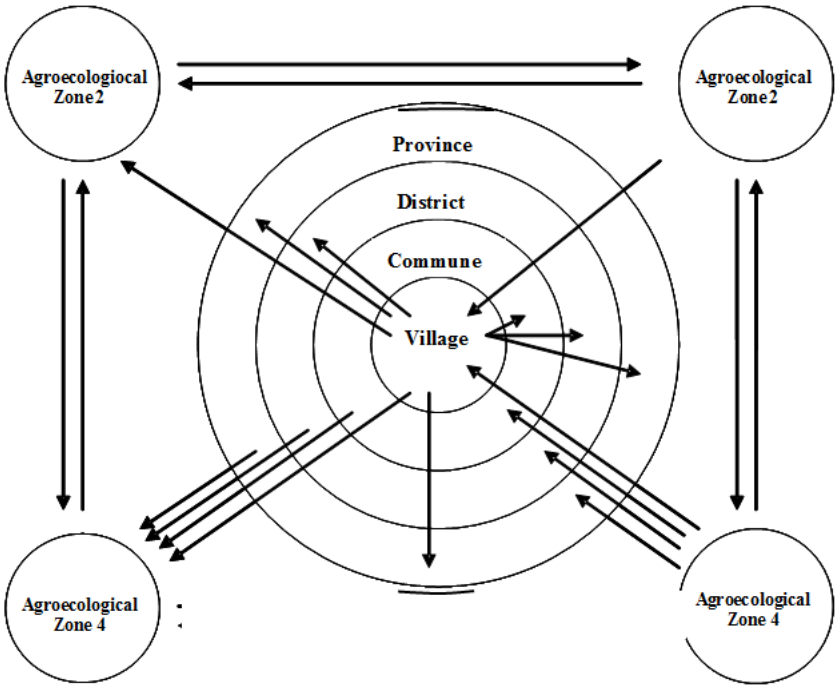


Figure A9-1: Flow diagram for recording flows up and down the hierarchy

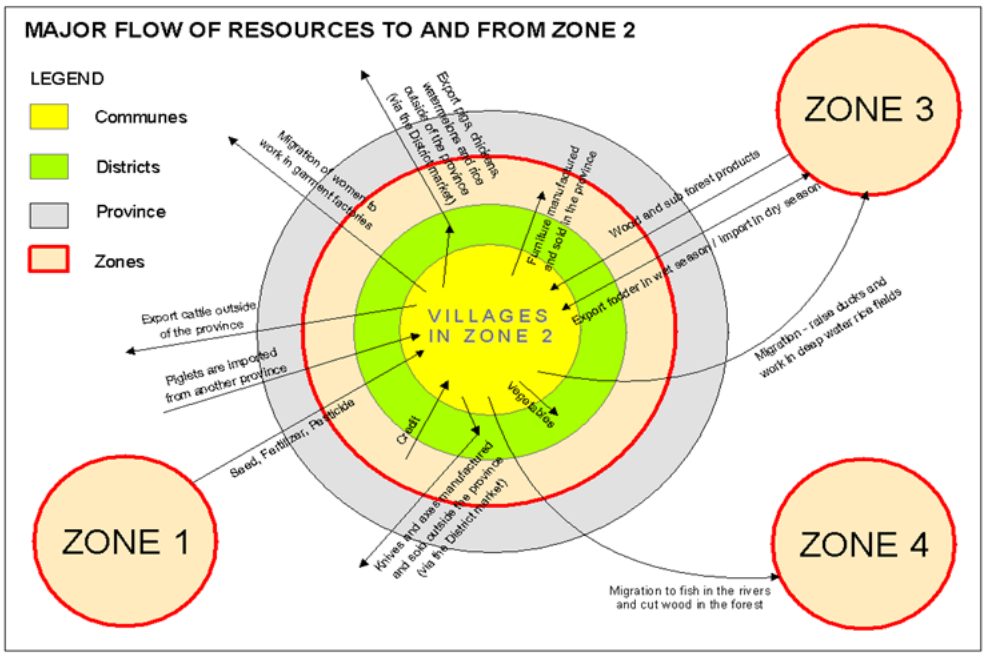


Figure A9-2: Example of a flow diagram

A10: Gross-Margin Analysis
(Source: modified from CAEA, 2011)

Gross margins of major products are developed using information derived from land users to better understand local production systems, and to see where improvements can be made. Gross margins for traditional practices can also be compared with those for improved practices to show farmers how they can adjust their farming systems to obtain better returns. A sample gross-margin analysis is presented in Table A10-2.

Key Steps

1. Select the three most important products relation to of income, which should include at least one crop, one livestock, and one fisheries land use type.
2. Analyze gross margin for these selected products by using information derived from consultation with land users.
3. During the analysis, items that land users are using as criteria to consider land use change are also identified.
4. Summarize the most important findings to identify ways to reduce costs and increase the benefits, as well as to identify new promising land use types and supports required to apply them.

Checklist
Table A10-1 presents a checklist of all items to be included in the Gross Margin Analysis.

Table A10-1: Checklist - Gross margin analysis

Cost calculations	Return calculations
Crops	
• Seed • Nursery operations • Land preparation • Animal manure/fertilizer and topdressing • Harvest • Post-harvest (cleaning, threshing, drying, processing) • Transport and marketing costs • Labor (family and hired) • Other downstream costs (specify)	• Yield • Post-harvest losses • Price • By-products (straw, fish, crabs, etc.) • Other returns (specify)
Livestock	
• Purchase/breeding costs • Feed • Vaccination/medicines/drenches • Labor (family and hired)	• Price • By-products (eggs, milk, etc.) • Other returns (specify)

• Transport and marketing costs • Labor (family and hired) • Other downstream costs (specify)	
Fish	
• Cost of fingerlings • Cost of fish feed • Labor costs • Travel and transport costs • Cost of equipment (pumps, cages, etc.) • Pumping costs • Processing costs • Marketing costs • Labor (family and hired)	• Yield • Post-harvest losses • Price • Sale of fish by-products • Value of fish consumed • Other returns (specify)

Table A10-2: Rain-fed, wet-season, transplanted rice gross-margin analysis

Activity	Quantity (units/ha)	Unit price (Riel)	Total price (R/ha)
Seed rice	50 kg	620	31,000
Rice nursery operations			
Land preparation	-	-	15,000
Animal manure	0.25 tons	60,000	15,000
Pull seedlings	10 man-days	6,000	60,000
Paddy rice operations			
Land preparation	1 ha	75,000	75,000
Transplanting	1 ha	75,000	75,000
Animal manure	-	-	-
Fertilizer	50 kg	1,070	53,500
Topdressing	-	-	-
Post-harvest operations			
Harvest	1 ha	100,000	100,000
Transport	1 ha	50,000	50,000
Threshing	1 ha	40,500	40,500
	Total expenses		510,300
Yield (kg)	1,710	450	769,500
	Total returns		769,500
	Net returns		256,500

A11: Market and Value-Chain Analysis
(Source: modified from CAEA, 2011)

Value-chain mapping allows a better understanding of market-related problems and opportunities for important livelihood products (crops, livestock, fish, NTFPs, etc.). Value-chain maps show the flow of a product through the marketing chain. It identifies where and how activities of different actors in the chain add value to the product. Analysis of completed value-chain maps allows price and market constraints to be identified along with opportunities to enhance value-added through additional or alternative operations by value-chain actors. The outputs of value-chain maps are used to plan market-related interventions.

Value chains vary across different products. For example, the value chain for rice, fish, or vegetable for family consumption is normally short and simple with only one type of actor, which is usually the farming family. However, the value chain for high-value fish species that are dried, graded, bulked, and exported is typically long and complex, with many different actors (fishermen, processors, middlemen, wholesalers, exporters, etc.) as in the example given in Figure A11.

Key Steps

1. Value-chain mapping should be done for the same important products for which gross margins were done, and should include at least one crop, one livestock, and one fish species.
2. Draw flowcharts that trace the movement of the product among the different actors along the marketing chain.
3. Start the value-chain map with the local producers by working backwards along the input supply chain and forwards along the marketing chain.
4. Obtain estimates of number of actors and the value of the product at each stage of the value chain.
5. Summarize the most important findings and try to identify the most significant constraints, bottlenecks, and opportunities for potential solutions on each link in the chain.

Checklist

Value-chain maps should contain all of the following:

- All actors in the value/market chain
- The number of actors at each step in the chain
- The value of the product at each step in the chain

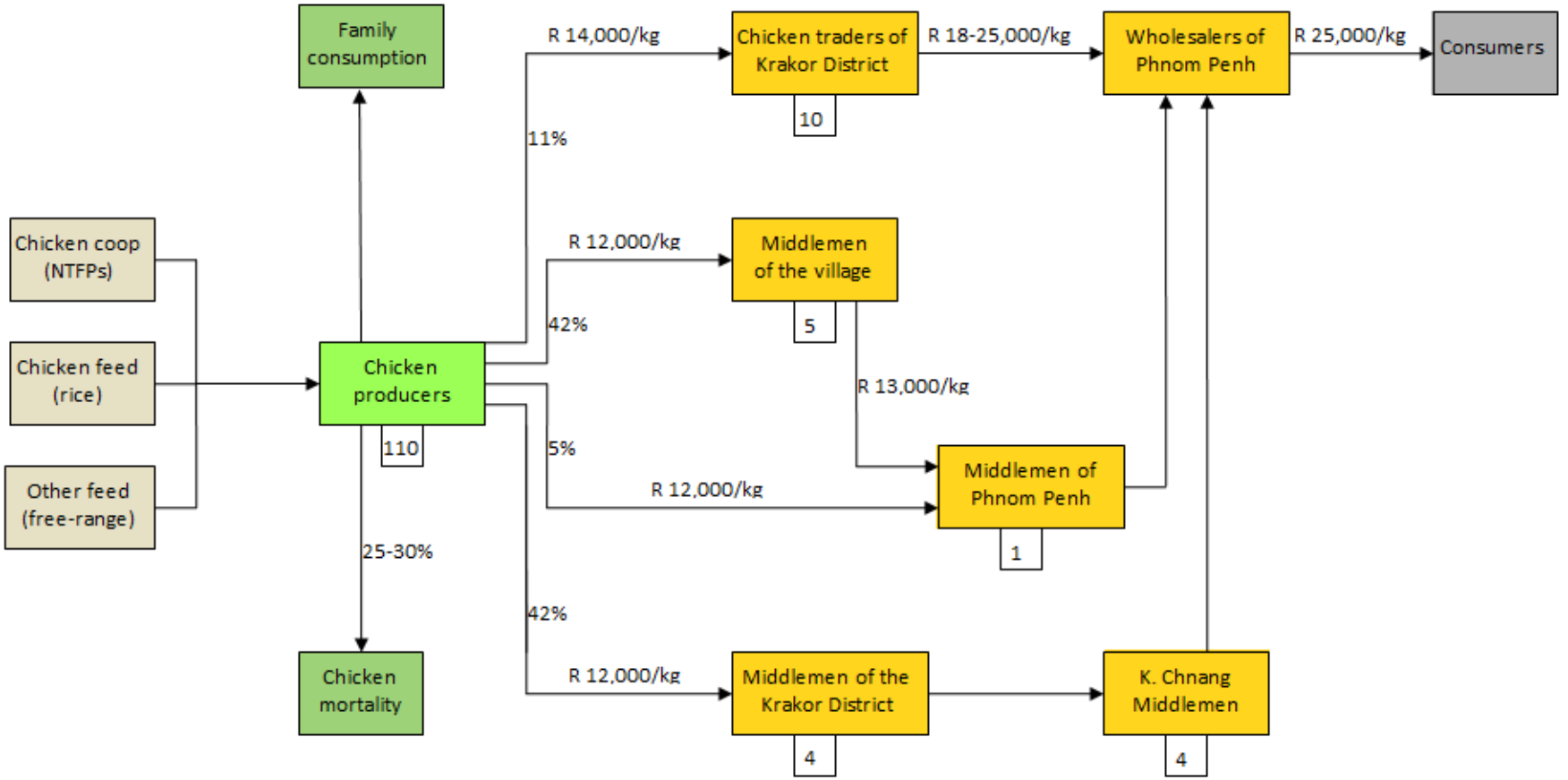


Figure A11: Chicken-value chain: Lowland lower terrace zone, Snar Ansa Commune, Pursat Province, Cambodia.

A12: Pair-wise Ranking Technique
(Source: modified from CAEA, 2011)

Pair-wise ranking provides a means to objectively rank issues, problems and solutions. It is used with land users to help them prioritize the problems that they face. Objectivity is improved if the ranking is conducted by a group of different types of people (men/women, better-off/poor, young/old, etc.), as it incorporates a variety of different perspectives and points of view. Consequently, pair-wise ranking should be conducted in a plenary group involving all key farmer-informants.

Key Steps

1. List all the problems raised by all groups, and by means of voting, produce a short list of about 10 problems identified as the most important.
2. List the priority problems in a matrix as shown in the example in Table A9-1.
3. Ask the participants to compare each problem with every other problem and, in turn, decide which is the most important.
4. Place the number representing the problem voted the most important in each comparison in the appropriate cell in the matrix.
5. When all comparisons have been completed, the scores (response frequency) are totaled as shown in the scoring chart, and the problems are listed according to their importance (see Table A12-2).

Table A12-1: Pair-wise ranking matrix

Table A12-1: Pair-wise ranking matrix

Key questions or problems	1. Lack of water in dry season	2. Poor roads and difficult access	3. Low district market prices	4. Declining NTFP availability	5. Declining soil fertility	6. Outbreaks of animal diseases	7. Lack of animal manure
1. Lack of water in dry season							
2. Poor roads and difficult access	1						
3. Low district market prices	1	2					
4. Declining numbers of NTFPs	1	2	4				
5. Declining soil fertility	1	2	3	4			
6. Animal disease outbreaks	1	2	6	6	6		
7. Lack of animal manure	1	2	7	7	7	6	

Table A12-2: Pair-wise ranking scoring chart

Key question or problem	Response frequency	Ranking
1. Lack of water in dry season	6	1
2. Poor roads and difficult access	5	2
3. Low district market prices	1	6
4. Declining numbers of NTFPs	2	5
5. Declining soil fertility	0	7
6. Outbreaks of animal diseases	4	3
7. Lack of animal manure	3	4

A13: Wealth Ranking Analysis
(Source: modified from CAEA, 2011)

Wealth ranking illustrates the variations in the poverty levels and equitability issues in the CSV. Through this, the characteristics, needs, and opportunities of each wealth class, particularly the poor, are identified.

Wealth Ranking Analysis begins by asking villagers to estimate the proportion of better-off, medium, poor, and very poor families in the CSV, then identifies the major characteristics of a typical better-off, medium, poor and very poor family. Different factors are used to characterize each wealth group as shown in the checklist and the examples given in Table A13.

Key Steps

1. Ask the key informants to estimate the proportion of 'better-off,' 'medium,' 'poor' and 'very poor' families in the CSV.
2. Using these socioeconomic classes, conduct wealth-ranking by following the template presented in Table A13.
3. Summarize the most important findings to analyze the differences among wealth classes and explore ways in which poorer villagers could move towards the land use types of the better- off. New land use types applied successfully in other villages can be also considered during the wealth ranking analysis.

Checklist

Wealth-ranking should cover the following factors:

- Family size and available labor
- Landholding: land size, land type(s) and number of parcels
- Farm assets (irrigation, wells, fish-ponds, machinery, etc.)
- Crops grown and relative areas
- Crop yields and use of inputs
- Livestock numbers and relative mix
- Used fishing sites/gear and fish processing activities
- Major income sources and relative proportions
- Off-farm labor (amount and type)
- Credit (access, uses and sources)

Table A13: Wealth-ranking template

Wealth class	Better-off	Medium	Poor	Very poor
1. Proportion (%)				
2. Family size				
3. Available labor				
4. Total land area (ha)				
5. No. of parcels				
6. Housing land (ha)				
7. Paddy land (ha)				
8. Orchard (ha)				
9. Other land (ha)				
10. Crop 1[a] (ha)				
11. Crop 2 (ha)				
12. Crop 3 (ha)				
13. Aquaculture[b]				
14. Number of cattle				
15. Number of pigs				
16. No. adult chicken				
17. NTFPs used				
18. Fishing sites				
19. Fishing gear used				
20. Fish processing				
21. 1st income source				
22. 2nd income source				
23. 3rd income source				
24. Off-farm labor				
25. Use of credit				

[a] Crops for main income. If there are many crops in the CSV, select only those cultivated by many villagers, e.g. more than 20%.

[b] For example, pond size for fish raising must be indicated in square meters or fish cage size must be indicated in cubic meters.

Sample results and suggested formats for presenting these attributes are presented in Figures A13-1 and A13-2.

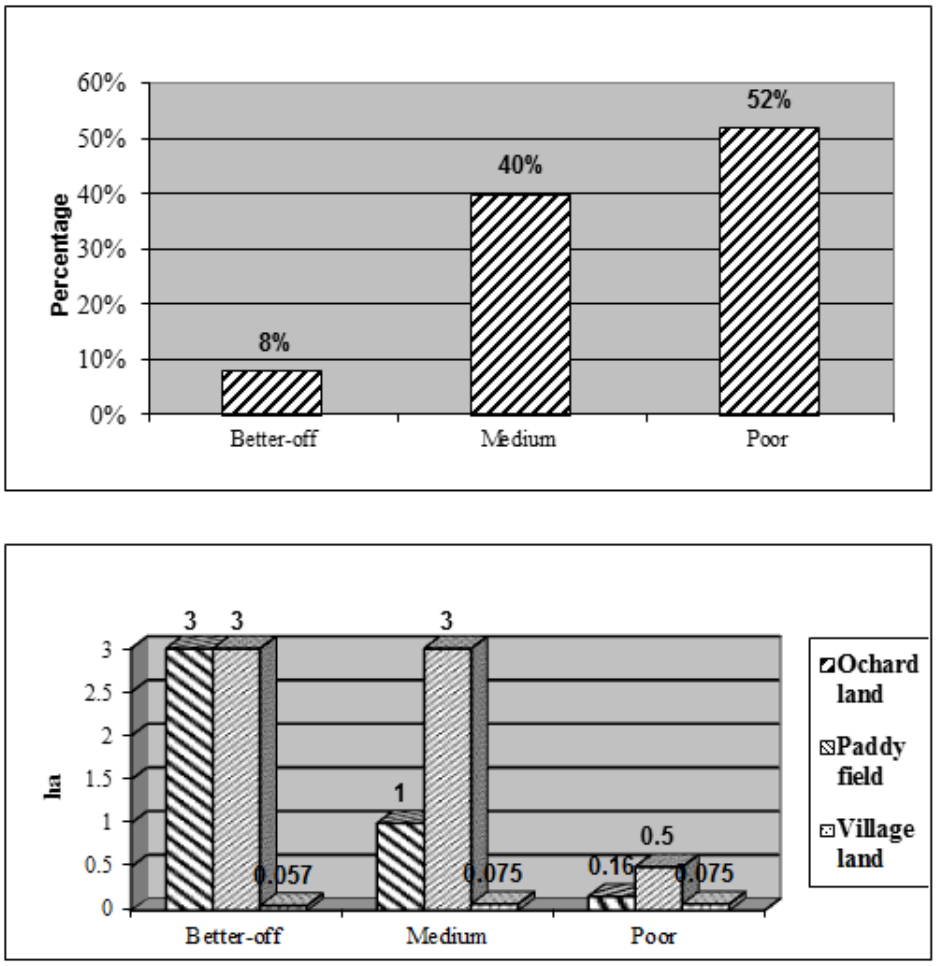
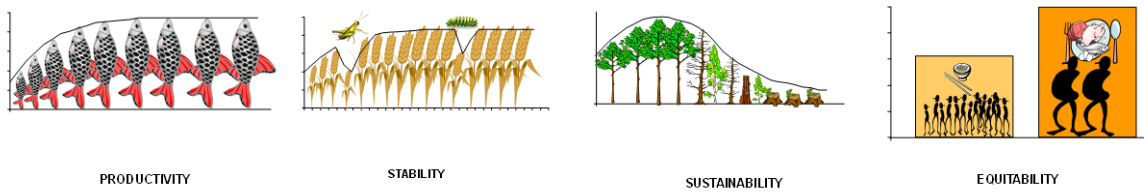


Figure A13-2: Wealth class and landholding

A14: Land Use System Properties Analysis
(Source: modified from CAEA, 2011)

The four properties used to describe the behavior of land use systems are illustrated below:

Productivity: **Stability:** **Sustainability:** **Equitability:**



Productivity: The level of production of the system (yield, profit, etc., per unit of land, labor, capital)
Stability: The degree to which productivity remains constant over space and time (measured as the inverse of the variability in productivity)
Sustainability: The ability of a system to maintain or increase its productivity over longer periods of time when subjected to stresses or large disturbances (trends in productivity)
Equitability: A measure of how evenly distributed the productivity or the benefits of the system are in the local population (various measures of distribution)

Key Steps

1. Formulate a list of important land use system
2. Draw simple graphs (Figure A14) for each system through discussions with land users

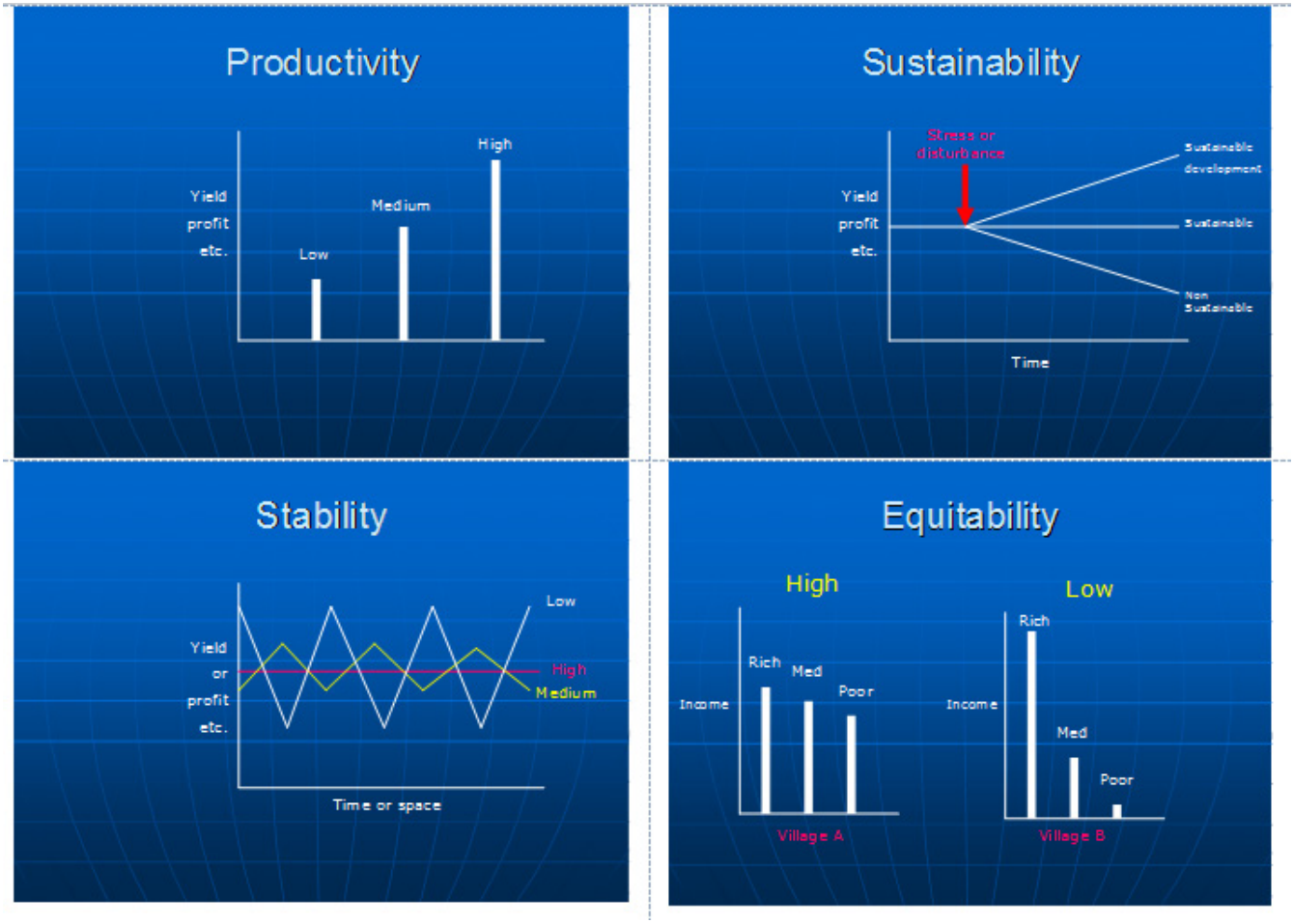


Figure A14: Land use system properties

A15: Land and Water Use Strategies
(Source: modified from CAEA, 2011)

Based on the combined findings during the PLUP process, land and water use strategies are formulated for each AEZ. An example is presented in Table A15.

Key Steps

1. Brainstorm the CSV problems and potentials to develop a future 'vision' for each AEZ.
2. Discuss how to move from the issues and potentials to the 'vision' (and identify where the gaps are).
3. Summarize land and water use strategies for each AEZ to identify and list the technical interventions required to implement the strategies.

Checklist

For each agroecosystem zone in the commune, provide the following information:

- Current land and water use
- Land resource management strategy
- Technical support requirements to achieve the strategy
- Water management strategy
- Technical support requirements to achieve the strategy

Table A15: Sample land and water use strategy table

Agro-ecosystem zone	Upland mixed crop zone	Lowland wet-season rice zone	Floating rice zone	Integrated farming and biodiversity zone	Flooded forest zone
Current land and water resource use	• Small hills, rolling upland with seasonal creeks • Used for cashew, community forestry upland crops, wet-season grazing, sandstone quarries, tourism and housing area	• Flat transition area with small streams and lakes between upland and floodplain • Used for rain-fed rice, vegetables, water melon, dry season grazing and aquaculture	• Flat, seasonally flooded fertile area with many small lakes • Used for floating rice, recession rice, cucumber, dry season grazing, community fisheries	• Flat, seasonally flooded grassland area with many larger lakes and a high water table • Used for floating rice, fishing, grazing, firewood • Important habitat for Bengal *Florican* fish	• Very flat and fertile seasonally flooded forest area • Used for floating rice, recession rice, firewood and lotus • Important habitat for waterfowl and fish breeding

Agro-ecosystem zone	Upland mixed crop zone	Lowland wet-season rice zone	Floating rice zone	Integrated farming and biodiversity zone	Flooded forest zone
Land resource management strategy	Modern cashew production integrated with mixed cropping and community forestry links to sustainable tourism	High and stable rice yields by new varieties, sustainable soil fertility and well-maintained irrigation infrastructure.	Deep-water and recession rice systems coupled with vegetables, NTFPs and grazing	Sustainable livelihoods based on integrated farming, fishing and conservation	Well-protected flooded forest for sustainable use of NTFPs, firewood and grazing
Main technical support requirements	1. Improved cashew varieties 2. Cashew processing 3. Tourism development 4. Market group support	1. Improved rice varieties and production technology 2. Improvement of rice quality and marketing support 3. Soil fertility management	1. Improved dry-season and floating rice production technology 2. Establishment and support for rice production and marketing groups 3. Land reform and land titling via Social Land Concession scheme	1. Floating rice improvement 2. Grassland management for cattle and wildlife 3. Conservation program for the *Bengal Florican* 4. Eco-tourism development	1. Flooded forest protection 2. Biodiversity conservation (habitat, waterfowl and reptiles) 3. Sustainable NTFP harvesting
Additional support requirements	1. Community forestry 2. Soil conservation and fertility management 3. Zero-tillage techniques	1. Irrigation rehabilitation 2. Establishment and strengthening of water user group 3. Groundwater development 4. Aquaculture support	1. Development of irrigation for floating and recession rice 2. Establishment and support of water user group 3. Community fisheries program.	1. Community fishery program 2. Conservation of fisheries breeding sites	1. Protection program for breeding sites of fisheries 2. Establishment of community fishery association 3. Reptile conservation program

A16: Preparation of Participatory Land Use Plan

After identifying development options or solutions for the land use problems and constraints, the consultation meeting starts to prepare a land use plan for all land units. Figure A16-1 also shows how land use plan can be decided.
Interventions to improve the land use system properties will be also analyzed, together with any potential support as shown in the example in Table A16.

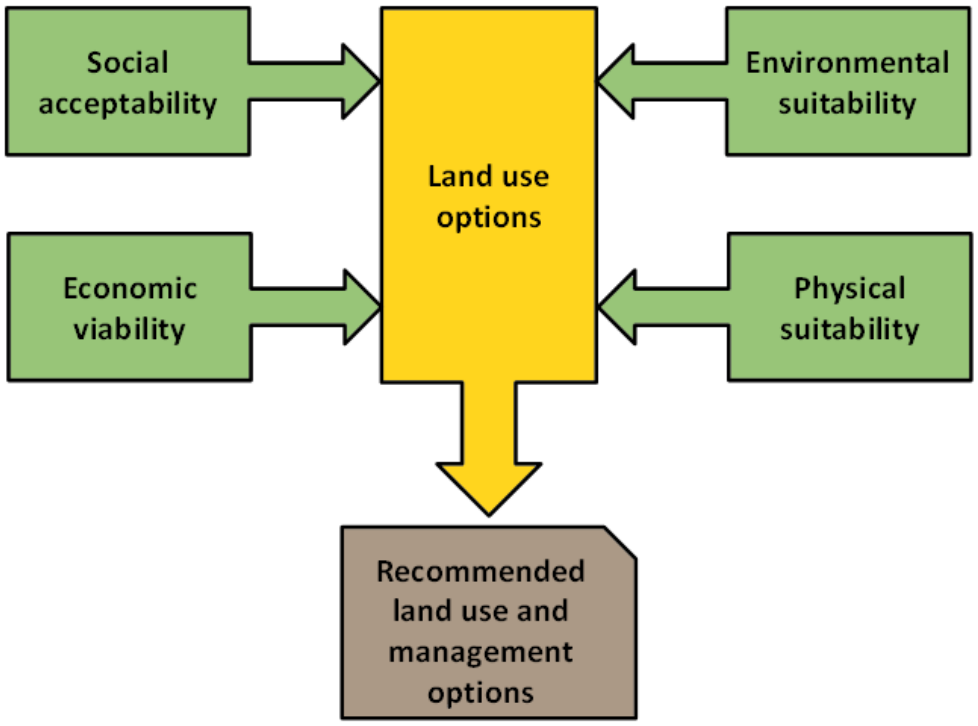


Figure A16-1: Land Use plan options chart (source: RLAUD, 2012)

Key Steps

1. Revise main land qualities of land units (LUs) in each AEZ
2. Revise main requirements of current and promising land use types (LUTs), with focus on constraints and required supports to apply these LUTs.
3. Match land qualities of each LU with requirements for each LUT to identify land use suitability of LU to each LUT, expressed by highly (S1), moderately (S2), marginally (S3) suitable, or non suitable (N). To determine the land use suitability, first, physical and environmental suitability can be considered followed by economic viability and social acceptability (two-stage approach in FAO land evaluation). Qualitative assessment or quantitative criteria can be also applied.
4. Summarize the suitability assessment to select the best LUT option for each LU based on land user's objective/criteria and identify key interventions to improve land use system properties and agencies that can support. To select the best LUT option, current LUT should be referred and the Pair-wise Ranking Technique and/ or simple scoring chart can be applied.
5. Draw the selected LUTs on the general base map to check if these selected LUTs are facing with any constraints that are not considered during previous analyses.

The table and the map provided by this tool are the main outputs of PLUP.

Table A16: Example of PLUP suitability and selection

AEZ	Land unit				LUT 1	LUT 2	LUT 3	LUT 4	LUT 5	Current LUT	Selected LUT	Required interventions for improvement	Who can support?
	ID	Main characteristic	Soil fertility	Water	Two rice	One rice	One rice + upland crop	Forest	Aqua-culture				
1	A	Low land	Poor	Not irrigated	N	S1	S2	S1	N	LUT 2	LUT 1	Irrigation	Irrigation department
1	B	Low land	Medium	Irrigated	S2	S1	S2	S1	S1	LUT 5	LUT 5	Fish market	Fisheries department
1	C	Low land	Rich	Irrigated	S1	S1	S1	S1	S1	LUT 1	LUT 1	High quality rice varieties	Rice research institute
2	D	Upland	Poor	Not irrigated	N	S2	S3	S1	N	LUT 2	LUT 3	Technologies and market for upland crops	Extension department and agro-industry companies
2	E	Upland	Medium	Irrigated	S3	S1	S2	S1	S2	LUT 3	LUT 3	Technologies and market for upland crops	Extension department and agro-industry companies
3	F	Sloping	Poor	Not irrigated	N	N	N	S2	N	LUT 4	LUT 4	Forest protection for NTFPs	Forestry department
3	G	Sloping	Medium	Not irrigated	N	S3	S3	S2	N	LUT 4	LUT 4	Forest protection for NTFPs	Forestry department

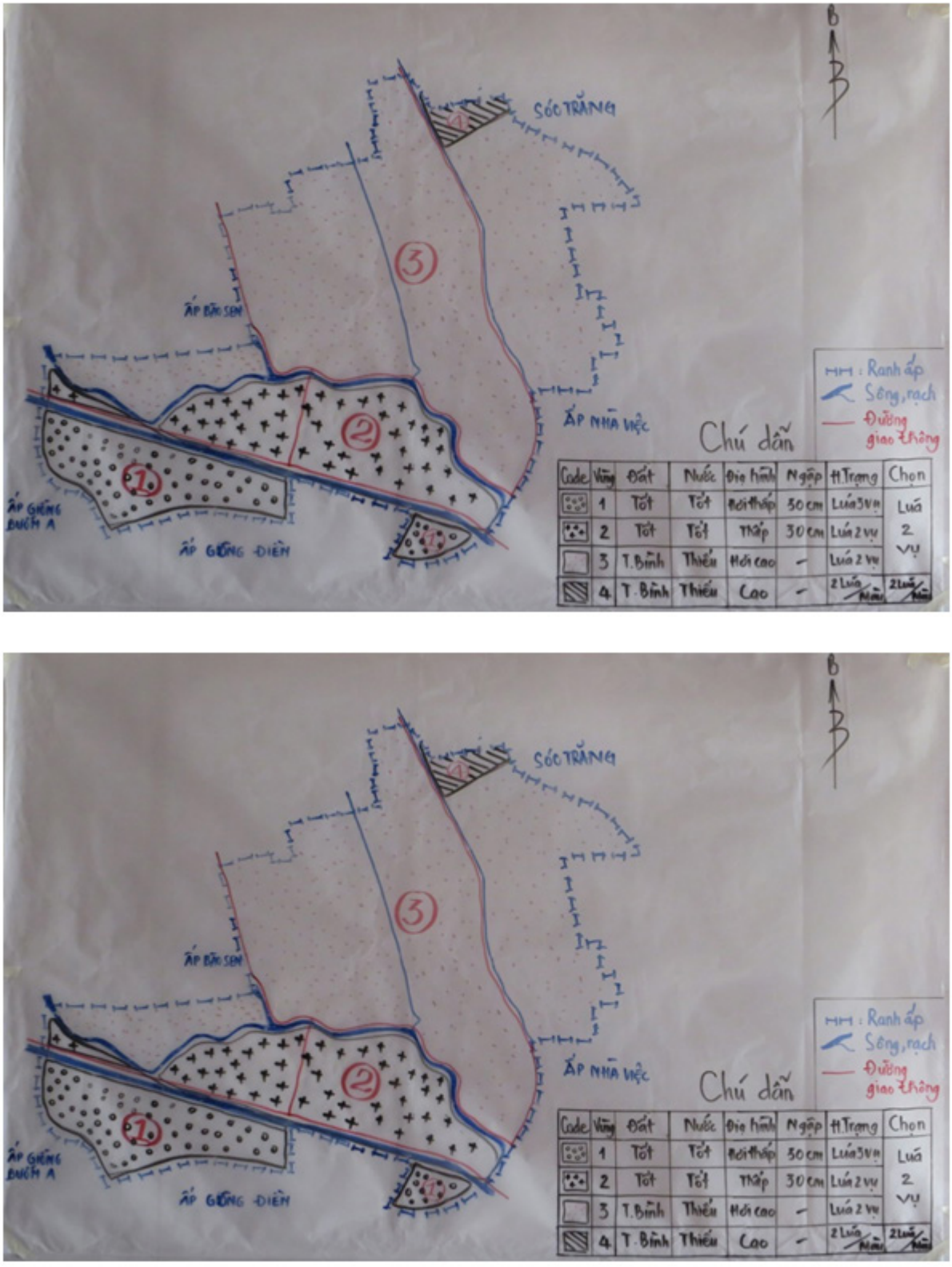


Figure A16-2: Example of an AEZ map and suitable land use types without (blue) and with climate change adaptation (red) in Tra Hat CSV, Bac Lieu Province, Vietnam

A17: Village History and Hazard Timeline
(Source: modified from Simelton et al., 2014)

A village history highlights key natural hazards and their impacts on land use in order to better understand vulnerability to extreme events and climate change. The output of this tool is a timeline showing the history of the village as well as the most significant natural hazards and disasters.

Key Steps
Start the timeline from the establishment of the village (or at least the past 40 years).
Row 1: Village development and key events
Row 2: Key land use changes
Row 3: Key natural hazards
Row 4: Key direct impacts of the hazard (physical and human damages, changes in land use as a direct consequence, relocation, etc.

If the History Profile (A5) of the CSV was prepared, rows 3 and 4 can be added to that history profile, and location of hazard impacts can be added to the general base map.

A18: List of Exposure to Extreme Weather Events
(Source: modified from Simelton et al., 2014)

The purpose of this tool is to identify of exposures to extreme weather events and when they most commonly occur.

The output is an extensive list of extreme weather events and their frequency. Local definitions of these exposures are included to enable ease of discussion. An example is showed in Table A18.

Key Steps

1. Prepare a list of extreme weather events as shown in column 1 of Table A18.
2. Fill out the table with information on extreme weather events provided during the consultation meeting.
3. Summarize the findings to identify the most relevant extreme weather events that can influence future land use.

Table A18: List of extreme weather events

Exposure	Month	Local definition
Drought	March–April	No rain, soil too dry for planting
Hot spell	July, August	Above 38oC
Cold spell	January	6–7oC
Early onset of rainy season	March	Raining in March
Delayed onset of rainy season	May	No rain until May
Flooding (from rain)	July–August	Standing water, 20 cm for at least 0.5 day
Flooding (from river, lake)	…	…
Landslide, flash flood		
Heavy rainfall		
Hail stones		
Typhoon		
Heavy storm		
Forest fire		

A19: Perceptions of Changes in Climate and Weather Patterns

(Source: modified from Simelton et al., 2014)

The purpose of this tool is to understand how farmers perceive climatic changes and changes in weather patterns. The output is a systematic analysis of participants' perceptions of changes in climate and weather patterns. The resulting qualitative data can be used for comparisons with projected climate change data from existing studies.

Key Steps

1. Prepare the table with marked seasons as shown in Table A19 below.
2. Discuss with land use villagers to fill information as shown in Table A19.
3. Summarize the findings to

Checklist
Answer three questions What?", "When?", "How?" in these boxes

What?
- Rainfall
- Temperature
- Wind
- Sunshine
- Cloudiness
- Other

When?
- Seasons (Spring-summer-autumn-winter)
- Monsoons (rain onset-duration –cessation)
- Time of day (night, day)

How?
- Amount
- Intensity
- Frequency
- Cyclic or regular
- Variability (day, month, year,...)
- Trend (increasing, decreasing)
- Abrupt

Table A19: Example on perception on climate change
(Note: 1/4, 1/2, 3/4, 1 = 25%, 50%, 75% and 100% agreed)

	Rainfall				Temperature			
Season	**Rain amount**	**Rain intensity**	**Dry Days**	**Other (Wind)**	**Night temperature**	**Day temperature**	**Sun**	**Other**
Winter: Dec, Jan, Feb				Windier, less foggy after cut forest 1989 (¼)		Gradual increase (½) since mid-80s (¼), since mid-90s (¼)		
Spring: Mar, Apr			Fewer since mid-90s (½)				Stronger, 'burns' maize leaves (1)	Apr temp is like May in the 60s
Summer: May, June, July, Aug	10-year cycles (top 1987, 1997, 2006) (½)	Increase since 80s (½)	Fewer since 80s (½)	Stormier since end 80s (¼)	Gradual increase since 80s (1)	Gradual increase since 80s (½)		
Autumn: Sep, Oct, Nov		Occasional intensive rain storms in Sep, never happened before 1990s (¼)		Stormy season used to end in Sep, since 1990s storms continue into late Sep two out of three years				Sep temp is like Aug in the 60s

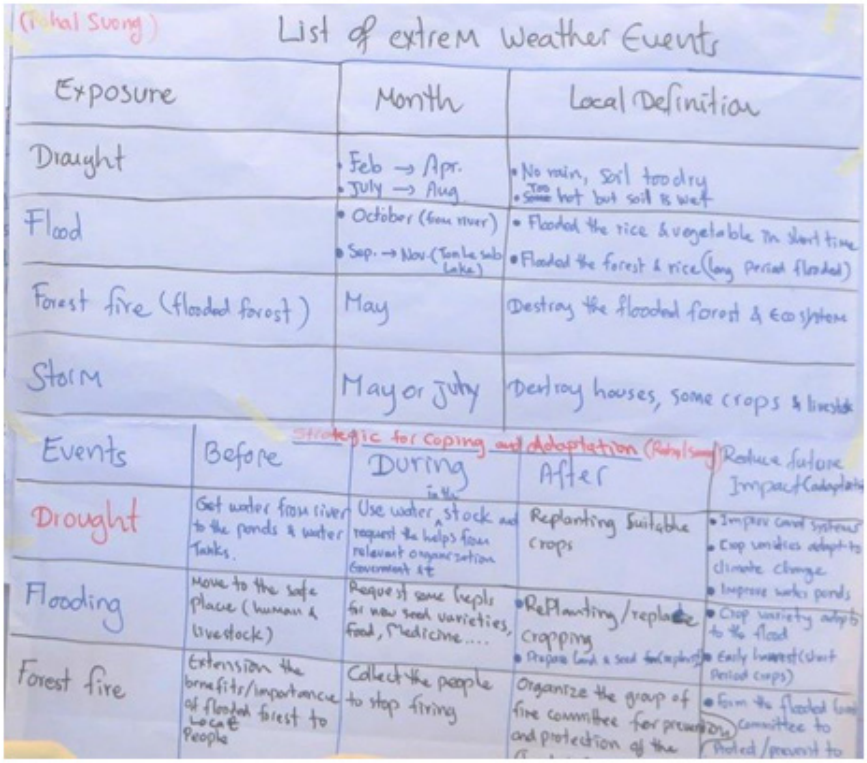
A20: Strategies for Coping and Adaptation
(Source: modified from Simelton et al., 2014)

The purpose is to document the strategies that land users use to reduce their vulnerability to extreme events. The tool identifies strategies for limiting impacts before, during, and after an extreme event, as well as highlighting possibilities for reducing future vulnerability. The output is a table presenting coping and adaptation strategies for dealing in extreme weather events.

Key steps

1. Prepare a flipchart with the list of exposures and divide the sheet horizontally into four parts: 'before', 'during', 'after' and 'reducing future impacts'
2. Discuss what to do to reduce the impacts of each exposure at the following time:
   - before (proactive)?
   - during (reactive)?
   - immediately after (reactive/coping)?
   - to reduce future impacts(proactive/adaptation)?
3. Summarize the findings to identify coping and adaptation strategies.

An example of the table is showed in Figure A20.


(Rohal Suong)

List of extreM Weather Events

Exposure	Month	Local Definition
Draught	• Feb → Apr. • July → Aug	• No rain, Soil too dry • Some hot but soil is wet
Flood	• October (from river) • Sep. → Nov (from lake sub Lake)	• Flooded the rice & vegetable in short time • Flooded the forest & rice (long period flooded)
Forest fire (flooded forest)	May	Destroy the flooded forest & ecosystem
Storm	May or July	Destroy houses, some crops & livestock

Strategic for coping and adaptation (Rohal Suong)

Events	Before	During	After	Reduce future Impact/Adaptation
Drought	Get water from river to the ponds & water Tanks.	Use water, stock and request the helps from relevant organization Government at	Replanting Suitable crops	• Improve canal systems • Crop varieties adapt to climate change • Improve works ponds
Flooding	Move to the safe place (human & livestock)	Request some helps for new seed varieties, Food, Medicine....	•RePlanting/replace cropping • Prepare land & seed for replanting	• Crop variety adapts to the flood • Early harvest (short period crops)
Forest fire	Extension the benefits/importance of flooded forest to Local People	Collect the people to stop firing	Organize the group of fire committee for prevention and protection of the	• Form the flooded forest committee to Protect/prevent to

Figure A20: Example of flipcharts showing exposure to extreme weather events and coping - adaptation to these events in Rohal Soung CSV, Battambang Province, Cambodia

A21: Venn Diagram
(Source: modified from CAEA, 2011)

A Venn diagram is used to analyze relationships between local communities and those projects and agencies providing them with support. It is useful in identifying potential development partners or detecting where interagency cooperation could be improved. An sample Venn diagram is presented in Figure A21.

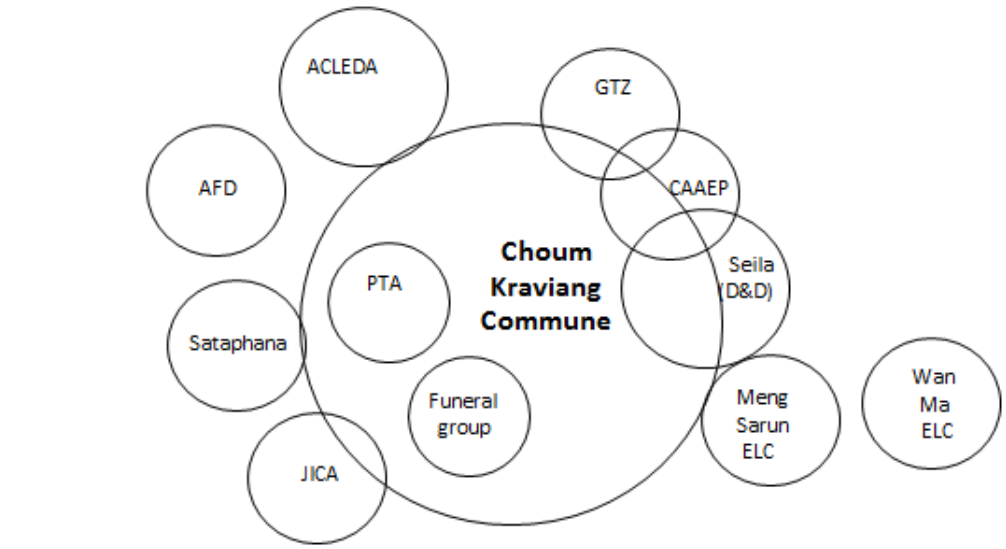
Key Steps

1. List all plans, projects, programs currently active in the CSV, along with a brief description of their major activities. Special attention is given to land use and water development plan by higher management levels of the CSV (commune, district, province and region).
2. Construct a Venn diagram, noting that overlapping circles represent good cooperation, touching circles represent some cooperation and non-touching circles representing poor or no cooperation at all.
3. Summarize the most important findings to identify potential partners/agencies that support or influence the land use plan.

Checklist

Venn Diagrams should include all projects, programs and activities implemented by:

- Government agencies;
- International donors;
- NGOs;
- Nonprofit organizations.;
- SMEs; and
- the private sector.



No contact	Seila	Rural development
Information is exchanged	CAAEP	Agricultural extension
Some cooperation in decision making	GTZ	Social land concessions
	JICA	Domestic water wells
	Men Sarun	Economic land concession
	Wan Ma	Economic land concession
	Belgian aid	School construction

Figure A21: Venn diagram for Choum Kraviang Commune, Kampong Cham Province, Cambodia

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RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security

CCAFS

Training Workshop on Participatory Land Use Planning for Climate-Smart Villages

18 – 21 August 2015
Bac Lieu Province, Vietnam

WORKSHOP REPORT

By **Chu Thai Hoanh**
Emeritus Scientist
International Water Management Institute (IWMI)

Table of Contents

Context and rationale

The regional climate change research for development (R4D) agenda and strategy was mapped out during a CCAFS SEA workshop last 12-14 March 2014, which was participated by the national agricultural research extension systems (NARES) from seven countries in the region. Climate-Smart Agriculture (CSA) is identified as a crucial and initial priority area for R4D collaboration. Work under this priority area will include the establishment of Climate-Smart Villages (CSVs) where integrated approaches to climate change mitigation and adaptation are tested in a participatory mode. Towards this, CCAFS and partners will be working with villages to help smallholder farmers adopt innovative and location-specific agricultural practices that can help them adapt to climate change and enhance food security.

In 2013 and early 2014, CCAFS SEA selected six (6) villages in Vietnam (3), Cambodia (1), and Lao PDR (2) as sites for CSV implementations, which started in 2015. Participatory land use planning (PLUP) will be implemented in these CSVs to help villagers incorporate their adaptation strategies to climate change and climate variability into their land use in the coming years. PLUP is essentially a bottom-up process that is implemented with active participation from the targeted community. This method evaluates and proposes the best possible uses of land resources in a village, particularly those designated for agricultural production (i.e., soil, water, plants, labor, capital, etc.). The feasible land use plan depends on the site-specific socio-economic and biophysical conditions and people expectations.

Considering the CSV approach, the following questions must be answered:

- What are the expected changes in the CSV landscape in the next 5 to 10 years?
- How can the household/community optimize agricultural land-use under the impacts of climate change and existing limitation of resources?
- How to synergize the land use plan in the CSV with the district and provincial land use plans?

Although developing land use plan with participation of stakeholders at community scale has been widely studied and documented, only few were integrated with climate change adaptation and mitigation strategies. Results from situation analysis and needs assessment conducted recently at the CSVs showed that exploring land use plan that copes with weather variability and climate change-related issues must be participated by villagers and other stakeholders. Community-based land use planning has become a part of CSV activities for social mobilization and community preparation in 2015. Ideally, outputs of this activity will support CCAFS Flagship Projects in designing and adjusting CCAFS interventions in the coming years.

The Guidelines for Participatory Land Use Planning for CSVs were prepared by CCAFS SEA. A training workshop was also organized to provide CSV teams techniques and tools for facilitating community-based land-use planning. The two-day training course is followed by a two-day field practice at Tra Hat CSV, Vinh Loi District, Bac Lieu Province in the Mekong River Delta of Vietnam. Two participants from each of Ma, My Loi, Phailom, and Rohal Suong CSVs, one from Ekxang CSV, and nine from Tra Hat CSV attended the workshop. The list of workshop participants is presented in Annex A.

Workshop objectives

At the end of the training workshop, the participants will be able to:

1) understand land use planning methods and process;
2) get familiar with techniques and tools to facilitate discussions for PLUP; and
3) develop land use plans with villagers and other stakeholders, taking into account climate change related issues.

Expected outputs

1) Participants with understanding of land use planning methods and process
2) CSV teams, with their learned tools and skills, to confidently conduct PLUP at their CSV.

Training Modules

Day 1 – 18 August 2015

1. Overview of participatory land use planning (PLUP) and PLUP with climate change adaptation (PLUP-CC)

2. **Step 1:** Planning and preparation of PLUP-CC

    a. Formulation of PLUP-CC team and organization
    b. Quick revision of PLUP-CC for targeted CSV
    c. Preliminary analysis – land use system definition and boundaries
    d. Preparation for consultation meetings at targeted CSV

Participants are preparing a general base map with agro-ecosystem zones of CSVs.

3. **Step 2:** Participatory land use planning without climate change adaptation (PLUP)

    a. Formulation of goals and objectives of land use plan
    b. Preparation of a general base map with agro-ecosystem zones (AEZs)
    c. Identifying land qualities of land units (LUs) in each AEZ
    d. Defining promising land use types (LUTs) in each AEZ
    e. Formulation of LUT options, and selection of preferable and feasible LUT in each LU of all AEZs

    Exercises of using tools in the PLUP Guidelines for Step 2

Day 2 – 19 August 2015

4. **Step 3:** Participatory land use planning with climate change adaptation (PLUP-CC)

    a. Identifying climate change/sea level rise (CC-SLR) issues
    b. Identifying changes in land qualities of LUs due to CC-SLR
    c. Revising promising land use types (LUTs) to adapt to CC-SLR
    d. Revising and selecting LUT in each LU to adapt to CC-SLR

    Exercises of using tools in the PLUP Guidelines for Step 3

5. Example of planning and preparation for PLUP-CC at Tra Hat CSV, Bac Lieu Province, Vietnam

Day 3 – 20 August 2015

6. Example of PLUP-CC consultation meetings at Tra Hat CSV, Bac Lieu Province, Vietnam

Participants at the consultation meeting at Tra Hat CSV, Bac Lieu Province, Vietnam

Day 4 – 21 August 2015

7. **Step 4:** Matching PLUP-CC with land use plans at higher levels

Example of consultation meeting with provincial, district, and commune authorities for Tra Hat CSV, Bac Lieu Province, Vietnam

8. Step 5: Preparation of PLUP-CC report for targeted CSV

9. Step 6: Follow-up action, participatory monitoring and evaluation

Exercises of planning and preparation for PLUP at CSVs of CCAFS SEA

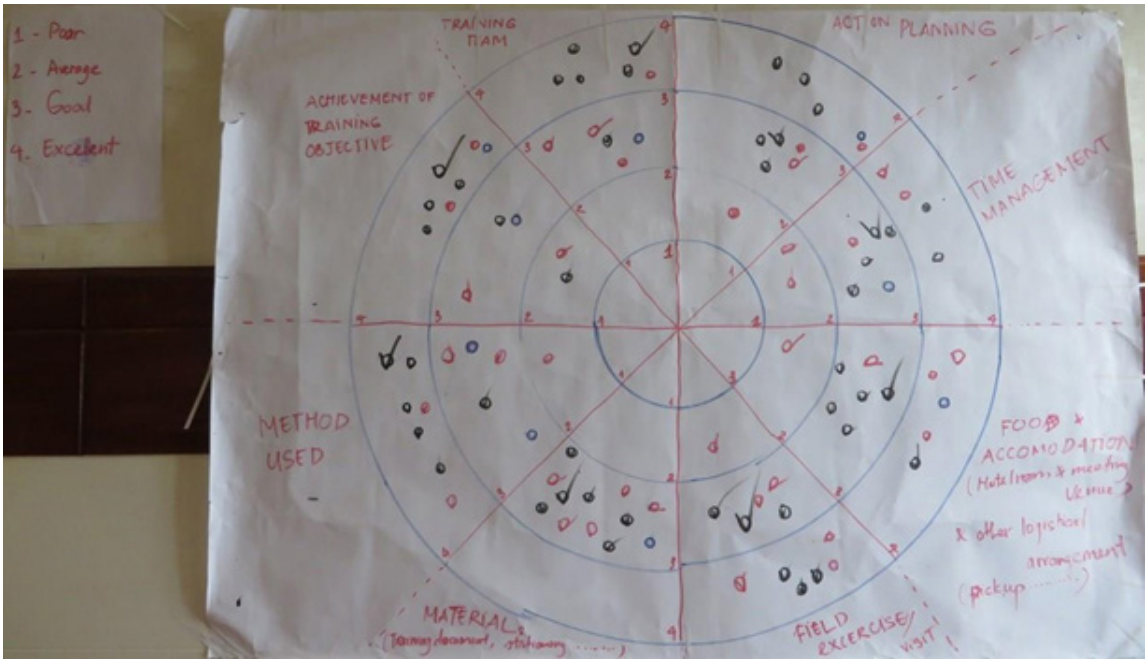
Consultation meeting with female and male groups at Tra Hat CSV, Bac Lieu Province, Vietnam

Participants' inputs

1. Division of participants into groups provided opportunities for everyone to contribute his/her opinions, which could not be done at the plenary with a large number of participants.
2. Discussions of male group finished earlier than the discussions of female group, therefore, facilitators need to coordinate so that all discussion topics could be completed by both groups.
3. Flexibility in selecting and combining tools in the Guidelines should be considered to fit in the CSV situation and context. One example is adopting the Pair-Wise Ranking Technique when applying other tools during PLUP-CC.
4. Given the farmers' busy schedule, proper coordination with local participants should be done before the consultation meetings at the CSV to have enough time for discussions.
5. Agro-ecosystem zoning by transect diagrams could be done before the consultation meetings to save time. Motorbike can be used when applying Transect Diagram tool.
6. Facilitators should be supported by a group of documentors who can help in writing the inputs of the participants on flipcharts (as what had been done in the exercise at Tra Hat CSV). This will help in saving time and keeping the discussion flow. There should also had a strong coordination between facilitators and documentors.
7. It is better to show the flipchart in front of participants while noting their opinions, and not put them on the floor as in the exercise at Tra Hat CSV.
8. Agro-ecosystems and land use types in Tra Hat CSV are simpler than in other CSVs, therefore consultation meetings for PLUP-CC at Tra Hat CSV could be done faster.
. After consultation meetings at the CSV, the draft PLUP-CC report could be sent to provincial, district, and commune authorities before organizing a consultation meeting to match with land use plans and other programs/projects at higher levels.

Participants' assessment

The chart presents the assessment of participants at the end of the workshop.



The results are summarized in the table below:

No.	Item	Poor	Average	Good	Excellent	Total
1	Achievement of training objective	0	2	3	7	12
2	Method used	0	1	4	7	12
3	Training team	0	0	5	6	11
4	Materials (training document, stationary)	0	0	12	0	12
5	Action planning	0	1	5	5	11
6	Time management	0	2	6	4	12
7	Field exercise visit	0	1	5	6	12
8	Facilities (accommodation, meeting venue, food, other logistical arrangements)	0	1	6	5	12
	Total	0	8	46	40	94

Annex A: List of workshop participants on 18–21 August 2015

Name	Position and Organization
1. Mr. Khean Sovannara	Chief of Farming System and Economic Office, Department of Agricultural Extension, Ministry of Agriculture Forestry and Fisheries (MAFF), Cambodia
2. Mr. Khlout Narun	Technical Staff, AphivatStrey (AS), Cambodia
3. Mr. Keophoxay Anousith	Research Assistant, International Water Management Institute, Southeast Asia Office (IWMI-SEA), Lao PDR
4. Mrs Khampamy Khodyhotha	Researcher, National Agriculture and Forestry Research Institute (NAFRI), Lao PDR
5. Mr. Khanthaly Souliyavongsa	Researcher, NAFRI, Lao PDR
6. Mr. Le Van Hai	Technical Officer, World Agroforestry Center-Vietnam (ICRAF VN)
7. Mr. Duong Minh Tuan	Technical Officer, ICRAF VN
8. Mr. Do Trong Hieu	Researcher, Northern Mountainous Agriculture and Forestry Research Institute (NOMAFSI), Vietnam
9.Mr Vu Hoang Lam	Researcher, NOMAFSI, Vietnam
10. Dr. Nguyen Hieu Trung	Dean of College of Environment and Natural Resources, Can Tho University, Vietnam
11. Dr. Pham Thanh Vu	Lecturer, Can Tho University, Vietnam
12. Mr. Phan Hoang Vu	Assistant Lecturer, Can Tho University, Vietnam
13. Ms. Nguyen Thi Phuong Thao	Assistant Lecturer, Can Tho University, Vietnam
14. Mrs. Nguyen Thi Song Binh	Assistant Lecturer, Can Tho University, Vietnam
15. Mr Ton That Loc	Post-graduate Student, Can Tho University, Vietnam
15. Mr. Le Minh Duong	Technical Officer, Department of Agriculture and Rural Development, Bac Lieu Province, Vietnam
16. Nguyen Van Yen	Cadastral Officer, People Committee of Chau Thoi Commune, Bac Lieu Province, Vietnam
17. Nguyen Thi Thuy Kieu	Cadastral Officer, People Committee of Chau Thoi Commune, Bac Lieu Province, Vietnam
18. Dr. Chu Thai Hoanh	Emeritus Scientist, International Water Management Institute (IWMI) – Trainer
19. Dr. Bui Tan Yen	Science Officer, International Rice Research Institute (IRRI)/CCAFS-SEA – Trainer
20. Mr. Ngo Duc Minh	Associate Scientist, International Rice Research Institute (IRRI)/CCAFS-SEA – Trainer

Annex B: List of villagers participating the consultation meeting at Tra Hat CSV on 20 August 2015

No.	Name	Gender	No.	Name	Gender
1	Ngô Thị Phấn	Female	11	Nguyễn Thanh Triều	Male
2	Lưu Thị Liễu	Female	12	Trần Hoàng Khải	Male
3	Trịnh Thị Lan	Female	13	Tào Thanh Sơn	Male
4	Trịnh Ngọc Thảo	Female	14	Lê Văn Tư	Male
5	Dương Thị Hạnh	Female	15	Trịnh Văn Tưởng	Male
6	Trần Thị Nhãn	Female	16	Trần Văn Hai	Male
7	Nguyễn Kim Xoàng	Female	17	Nguyễn Văn Thủy	Male
8	Lâm Thị Bích Yến	Female	18	Hà Văn Vững	Male
9	Tào Thanh Thủy	Female	19	Trịnh Văn Minh	Male
10	Trịnh Ngọc Diệu	Female	20	Lê Văn Tuấn	Male

Annex C: List of local authorities attending the consultation meeting at Bac Lieu on 21 August 2015

No.	Name	Organization
1	Phùng Văn Việt	Village Head, Tra Hat village, Chau Thoi commune, Vinh Loi District, Bac Lieu Province
2	Đoàn Thanh Đoàn	Chairman of People Committee, Chau Thoi Commune, Vinh Loi District, Bac Lieu Province
3	Dương Văn Viễn	District Department of Agriculture and Rural Development, Vinh Loi District, Bac Lieu Province
4	Tô Thanh Hải	Agricultural Extension Station, Vinh Loi District, Bac Lieu Province
5	Trần Quốc Nghiệp	District Department of Natural Resources and Environment, Vinh Loi District, Bac Lieu Province
6	Trần Thanh Thi	Provincial Department of Natural Resources and Environment, Bac Lieu Province
7	Lâm Ngọc Bửu	Provincial Department of Agriculture and Rural Development, Bac Lieu Province

Annex D: Agenda of the Training Workshop from 18 to 21 August 2015

Day 0: 17 August 2015 (Monday)		
Arrival of participants		
Day 1: 18 August 2015 (Tuesday)		
Time	**Activity**	**Responsible**
8:30 – 8:45	Registration of participants	Ngo Duc Minh
8:45 – 9:00	Opening ceremony	Bui Tan Yen
9:00 – 9:15	Introduction	Bui Tan Yen
9:15 – 10:00	Land use planning and methods, required information and data, analysis methods, outputs, outcomes and impacts.	Chu Thai Hoanh
10:00 – 10:30	Coffee break	
10:30 – 12:00	Continue: Land use planning and methods	Chu Thai Hoanh
12:00 – 13:30	Lunch	
13:30 – 17:00	Land use planning at household level and Participatory Land Use Planning at community level, with examples/exercises	Chu Thai Hoanh
Day 2: 19 August 2015 (Wednesday)		
8:30 – 10:00	Participatory Land Use Planning with climate change-related issues (PLUP-CC): methods and process	Chu Thai Hoanh
10:00 – 10:30	Coffee break	
10:30 – 12:00	Continue: PLUP-CC	Chu Thai Hoanh
12:00 – 13:30	Lunch	
13:30 – 15:00	Example of design PLUP-CC process for Tra Hat Exercises for other CSVs.	Chu Thai Hoanh
15:00-15:30	Coffee break	
15:30-17:00	Exercises for other CSVs	Chu Thai Hoanh

Day 3: 20 August 2015 (Thursday)		
7:30	Departure for Tra Hat CSV	Ngo Duc Minh
8:30-11:30	Practice of PLUP-CC designed in Day 2 for Tra Hat Village through interaction with the villagers	Chu Thai Hoanh Nguyen Hieu Trung
11:30-13:30	Lunch	
13:30-16:30	Continue: Practice	Chu Thai Hoanh Nguyen Hieu Trung
16:30	Travel back to Bac Lieu City	Ngo Duc Minh
Day 4: 21 August 2015 (Friday)		
8:30 – 10:30	Matching PLUP-CC with LUP at district and provincial levels, including adaptation action plan Example with Tra Hat CSV	Chu Thai Hoanh Nguyen Hieu Trung
10:30 – 10:45	Coffee break	
10:45 – 12:00	Continue: Matching PLUP-CC	Chu Thai Hoanh
12:00 – 13:30	Lunch	
13:30 – 15:30	Discussion on lesson learned from Tra Hat exercise, and adjustment for other CSVs	Chu Thai Hoanh
15:30- 16:00	Wrap up and closing ceremony	Bui Tan Yen
Day 5: 22 August 2015 (Saturday)		
Departure of participants		

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