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Participatory Data Collection for Ecosystem Services Research

A Practitioner's Manual

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Abstract

From achieving food and water security to ensuring biodiversity conservation, many of the challenges facing the modern world require an understanding of the interdependencies between ecosystem services and poverty alleviation. This manual presents a series of qualitative data-collection tools often grouped under the umbrella of Participatory Rural Appraisal (PRA) that can be used to obtain local information on the contributions of ecosystem services to livelihoods and food security as well as their implications for natural resource management initiatives. Drawing on the experience of the ESPA-funded ASSETS project in investigating the links between ecosystem services, food security and nutritional status at the forest-agriculture interface, this manual outlines the process of developing a project-specific set of PRA tools. This process begins with a review of project objectives and key concepts, on the basis of which a set of desired variables can be identified. These, in turn, determine which PRA tools should be applied. Detailed instructions are provided for over 20 of these tools, from well-being ranking to mapping, matrices, seasonal calendars and Venn diagrams. All are presented in a consistent format which outlines the objectives of the exercise, who it should be carried out with, what equipment is needed, what diagrams might be drawn and what sorts of prompt questions could be asked. The manual also provides guidance on the logistics of planning and implementing participatory research, including discussion of the ethical issues that may arise, and how best to report and synthesise results across several sites. By applying these varied tools, users will be able to collaborate with local communities to obtain current and trend information on livelihoods and land use, food security (including seasonal changes and coping strategies), mapping and ranking of ecosystem services as well as gaining an understanding of natural resource governance systems and local perceptions of key drivers of change. The methods presented here should be of interest to researchers working broadly in the field of ecosystem services and well-being issues, enabling them to improve their understanding of the ways ecosystems function, the services they provide to a range of different beneficiaries and their relationship with the political economy and sustainable development.

Acknowledgments

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Introduction

Since September 2015, the United Nations has enshrined the principle of sustainability in its development agenda. Poverty eradication, promoting sustainable patterns of consumption and production, and protecting and managing natural resources have been adopted as the overarching objectives guiding internationally agreed development goals for 2030 (UN, 2015). These global objectives, alongside growing concern for assessing impacts of climate change, demand greater efforts to understand the interdependencies between ecosystem services and poverty alleviation, from achieving food and water security to ensuring biodiversity conservation.

This has led to a burgeoning stream of research on ecosystem services using a variety of methods. At the heart of this research is the need to (i) understand how different people use and benefit from their surrounding environment, (ii) identify locally-defined threats to both ecosystems and livelihoods, and (iii) explore local perceptions of the challenges and opportunities for achieving sustainable resource management.

Participatory research methods are especially appropriate for helping to answer some of the often complex and locally-specific questions addressed by ecosystem services research. In particular they can contribute to (Poppy et al., 2014):

- Identifying the locally perceived benefits the rural poor obtain from ecosystems;
- Identifying different groups of beneficiaries of ecosystem services, each of them with different interests and practices (forms of resource exploitation and management);
- Prioritising and valuing ecosystem services for different social groups using local criteria (e.g., cultural acceptability);
- Linking local spatial data on ecosystem service sources and flows with mapping and modelling techniques for scenario building; and
- Fostering deeper conversations with users and managers of ecosystem services.

This manual presents a series of qualitative data-collection tools often grouped under the umbrella of Participatory Rural Appraisal (PRA) that can be used to obtain local information on contributions of ecosystem services to livelihoods and food security as well as their implications for natural resource management initiatives. Some of the individual tools (like well-being ranking, mapping, matrices, seasonal calendars and Venn diagrams) have been described well elsewhere (e.g. Pretty et al., 1995; Kumar, 2002). These PRA tools have a long tradition of use among development practitioners to build an agenda for action with communities (e.g., participatory project design). However, the academic research community has tended to take a fairly limited view of their utility, employing them primarily to provide contextual information (e.g. rich descriptions of local livelihoods) and/or specific information inputs for more conventional data-collection tools (like household surveys). Using the example of a multi-disciplinary and multi-country research project, this manual illustrates how an integrated consideration of a project's research questions, key concepts, PRA principles and tools can be used to develop a well-integrated method that can make a substantial and stand-alone contribution to ecosystem services research.

This text was originally prepared in November 2012 to provide guidelines for collaborators on the ASSETS project (www.espa-assets.org) on how to carry out community level research on food security using an ES framework. This version has been updated to take into account the field experience of the ASSETS research teams in Malawi, Colombia and Peru and includes example diagrams from these field sites. Our aim was to provide sufficient information to ensure

that a standard set of information would be collected across all local partners and in all the communities involved in the project. Although designed to meet the specific research objectives of the ASSETS project, we hope that the methods presented here will also be of interest to other researchers working on ecosystem services and well-being issues.

The text consists of several sections. Section 1 provides a brief introduction to the ASSETS study, its research questions and main concepts. Table 1 provides an overview of how each research question is linked to a set of desired variables which can be obtained by using one or more PRA tools. A table of this kind can easily be adapted to the needs of other projects to guide the choice of appropriate PRA techniques. Section 2 summarises some of the guiding principles of PRA research which should be followed by all data-collection teams. Section 3 presents the data-collection protocol and list of information outputs to be generated through different exercises in relation to our research questions. Section 4 constitutes the core of the manual, providing detailed instructions for the implementation of a wide range of individual and group data-collection activities. For each exercise we outline why it should be carried out, who with, with what equipment and how (including lists of prompt questions which can be adapted to the needs of other research projects). Diagrams from pilot test events and from study-sites are included as illustrative examples. Section 5 contains the project information sheet and written and verbal consent forms required for the data-collection process. Finally, section 6 contains a proposed structure for a summary report to pull together the information collected through the different methods presented.

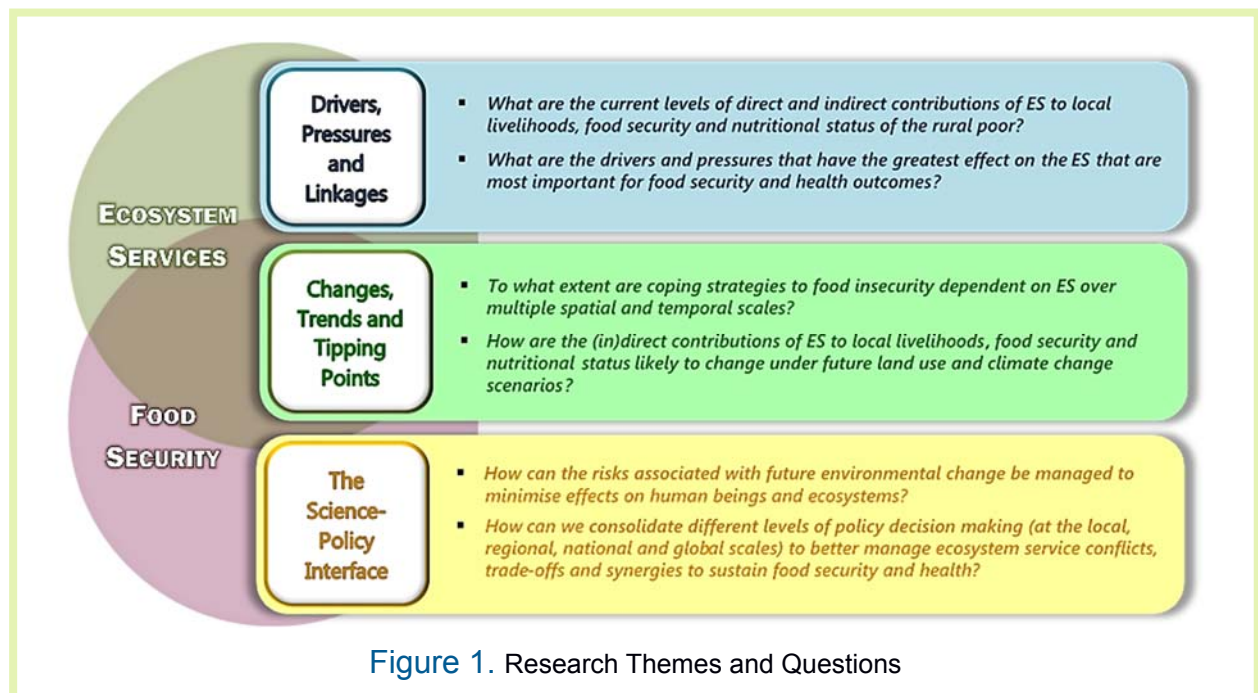
We anticipate that this manual will be useful to researchers working broadly in the field of ecosystem services. Although our own work has focused on communities at the forest-agriculture interface, the methods can be adapted to working with many different types of local communities in a wide range of more or less intensively managed ecosystems. This manual should not be read as a rigid step-by-step manual. Methods, tools and research queries contained in the text are presented as informed suggestions for fieldwork. We hope they will inspire the creativity of researchers to select appropriate approaches and incorporate additional elements, where of interest to themselves or the community.

1. ECOSYSTEM SERVICES AND FOOD SECURITY: A RESEARCH FRAMEWORK

1.1. Themes and Questions

This manual presents a series of participatory research exercises that address the overall research objective of the ASSETS project: ***to explicitly quantify the linkages between the ecosystem services (ES) that affect – and are affected by – food security and nutritional status for the rural poor at the forest-agricultural interface.***

The project divided this research goal into three themes, each comprising two specific research questions (Fig. 1). These themes comprehensively assess and analyse the spatial and temporal pathways from ES to food security and nutritional status. This framework has guided the structure of this PRA manual.



1.2. Key working definitions

The research team in charge of setting up fieldwork should discuss the following concepts and terms (and how they are translated into local languages) with the enumerators and use them in a consistent fashion throughout the data-collection process.

a) Ecosystem

This can be defined as “a dynamic complex of plant, animal and microorganism communities and their non-living environment [such as air, water and minerals] interacting as a functional unit” (MA, 2005, p. v). Ecosystems are typically defined by the network of interactions between living and non-living components, which give specific environmental and biological characteristics to rather limited spaces (e.g., different types of forest grow in

places with specific climate and soil, in turn, favouring the presence of certain animal species that could be unique to that habitat).

b) Ecosystem Services

Broadly speaking, these are “the benefits that people obtain from ecosystems” (MA, 2005, p. v). They include goods, such as wild-fruits and bush-meat, as well processes, such as pollination and pest regulation. They refer to the components of nature that are directly or indirectly enjoyed, consumed or used by humans in order to maintain or enhance their well-being (Boyd & Banzhaf, 2007).

At present, there is no agreed classification of ES (Haines-Young & Potschin, 2009). The most widely used classification was proposed by the Millennium Ecosystem Assessment and postulates four general types of ES (Fig. 2):

- Provisioning services: Tangible products that people obtain from nature for direct consumption / use (e.g., food, drinking water, timber and firewood).
- Regulating services: Processes that regulate the workings of ecosystems from which human beings benefit (e.g., air quality regulation, water regulation and pest-regulation).
- Cultural services: Non-material benefits that people obtain from ecosystems through cognitive development, spiritual enrichment, recreation or aesthetic experiences (e.g., religious values, social relations, sense of identity place, recreational spaces).
- Supporting services: Those necessary for the production of all ES, which operate as very long-term processes and whose impact are indirect, often unnoticed by human-beings (e.g., photosynthesis or soil formation).

c) Final ES (goods) and ES benefits

ES can be distinguished from the benefits they generate and the tangible resources used by human beings. Goods or ‘final ES’ refer to those tangible outputs from ecosystems that people value through experience, use or consumption. This does not mean that they have an established price but that people attribute an importance to them (e.g., cultural values associated with certain plants or animals). A critical feature of these end-products is that for them to contribute to human well-being there needs to be some form of ‘capital investment’ (e.g., wildlife only becomes a food source after humans invest time, labour and equipment into hunting activities) (Mace et al., 2012).

Final ES or goods, in turn, generate ‘benefits’ depending on the use that human beings give to them according to their interests and values (e.g., some wildlife can be considered food, some can be considered sacred). ES-benefits thus refer to nature’s impacts on human well-being, the distinctive gains that individuals, households and communities obtain from nature’s outputs by virtue of their use, consumption or enjoyment (e.g., food or income from wildlife and wild-fruits; construction materials from trees, leaves or rocks; medicines from plants or animal parts, etc.) (Boyd & Banzhaf, 2007; Haines-Young & Potschin, 2009). It is important to highlight, in addition, that benefits can also be derived from managed ecosystems, such as fallows and fields (i.e., agro-ecosystems).

d) Ecosystem disbenefits

Although human beings obtain various benefits from ecosystems, the same processes that facilitate the generation of benefits may equally lead to the generation of what some perceive to be disbenefits (i.e., loss of well-being) (Dunn, 2010). These have various

shapes, such as waterborne diseases (e.g., malaria), pests that eat crops or poisonous animals that may even kill humans. Any discussion on the products obtained from nature should thus look at both positive and negative impacts.

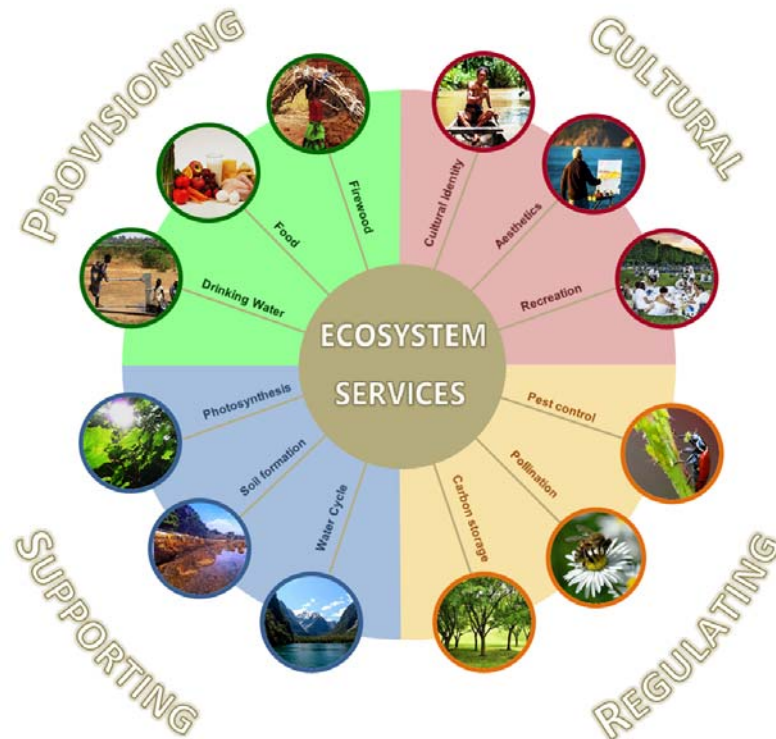


Figure 2. Types of Ecosystem Services

e) Food security

According to the Food and Agriculture Organisation (FAO), food security can be defined as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2002). This concept entails four key dimensions:

- Availability: When sufficient quantities of appropriate food are supplied.
- Access: When people have the entitlements required to obtain food. Among others, these could involve legal and political rights (e.g., formal segregation); socio-cultural arrangements (e.g., informal discrimination) or economic rights (e.g., adequate employment and income).
- Utilisation: When food is adequately stored, prepared, varied, and consumed so as to ensure it satisfies individuals’ nutritional needs.
- Stability: When people can satisfy their food needs at all times.

f) Drivers and Pressures

The relationship between ecosystems and societies / communities is continuously changing. The diverse factors leading to change can be grouped into two broad categories: drivers and pressures (Rounsevell, Dawson, & Harrison, 2010). Drivers are the underlying causes of environmental change that are **exogenous** to the system or region in question (e.g., climate change, national environmental laws or international policies). Drivers are also called 'indirect drivers' by the Millennium Ecosystem Assessment (2005).

Pressures, in turn, refer to the **endogenous** variables that reflect the impact of drivers within a system or region (e.g., temperature increase, local water demand, crop prices or prevalent forms of commercialisation of natural resources). Pressures can also be identified as 'direct drivers' (MA, 2005), which are the physical, biological or chemical processes that directly cause changes in ecosystem goods and services.

g) Tipping points

Tipping points refer to critical thresholds at which small changes generate big impacts. Certain human activities may set in motion reinforcing processes that push an ecosystem in a different direction; a new state that alters the existing biodiversity and the services that people receive. The resulting changes may be very difficult (if not impossible) to reverse despite significant investments. For example, if deforestation occurs on a steep slope, bare soils may be washed away, making any later attempt to re-establish forest cover extremely difficult (and expensive) to achieve this recovery.

h) Households

Typically, a household refers to a person or group of persons who live together and make common provision for food or other essentials for living (United Nations, 2008). These persons may pool their resources (monetary and non-monetary) to satisfy their needs; may be related or unrelated; and may share housekeeping responsibilities. In summary, 'households' signify domestic and economic social units (i.e., people jointly generating and/or managing resources).

Be aware that households cannot be equated to families. 'Families' allude to social relationships, bonds of blood and matrimony whilst a household refers to a production unit.

Understandings of what a household is may vary according to context. Some countries use a 'household-dwelling' concept, in which a household consists of all persons living together in a housing unit. In other settings, a 'household' is usually equated to a couple (married or non-married) living together with dependents (children or aged parents). In polygamous communities, in turn, this definition requires some adjustments (e.g., the entire family unit would be considered a single household if all wives and husband live together and share their meals; if wives live in other locations, some of them may be considered female-led households).

For a participatory data-collection process, it is important to work with the local definition of 'household'. This may or may not match the definitions presented above. Take careful note of the key differences and be consistent in your use of the dominant local understanding.

In a similar vein, the **head of household** is the person who is commonly seen by the members of the household as their head. Generally, this is the main economic contributor to the household and/or the one who makes the main decisions. Make sure to determine and abide by the decisions of the members or informants.

i) **Well-being**

There is no single agreed definition of 'well-being'. The World Bank's 'Voices of the Poor' research project, for instance, highlights five dimensions: i) material well-being (e.g., food, assets and work); ii) bodily well-being (physical and mental health); iii) social well-being (self-respect, dignity and good social relations); iv) security (safety in life and confidence in the future); and v) freedom of choice and action (Narayan et al., 2000). This is the multidimensional definition adopted by the Millennium Ecosystem Assessment (2005).

However, there are also other approaches. The Organisation for Economic Cooperation and Development (OECD), for instance, prefers to work with three dimensions: i) material living conditions (or economic well-being); ii) quality of life, the set of non-monetary attributes that shape an individual's life chances and have intrinsic value under different cultures and contexts (e.g., education, social connections, happiness); and iii) the sustainability of the socio-economic and natural systems where people live and work (OECD, 2013).

As is the case with the concept of *household*, it is necessary to work with local understandings of well-being. However, make informants aware that we are not interested solely in financial or material indicators of wealth (income, savings, size of landholdings, livestock, etc.) but also in non-material ones (e.g., health, levels of formal education, political participation, etc.).

1.3. Integration of research components

Figure 3 illustrates the integration of the key concepts and variables discussed in this section. **Food security** constitutes the most basic human need and hence its study helps us to identify and prioritise the ES most important to local populations. This requires us to look at the relationship between ES and households in terms of the four dimensions of food security: i) *availability* (e.g., presence of wild-foods like fruits and game that people eat or fertile land that can sustain crops); ii) *access to food* (affected by factors such as community cohesion and natural resource governance, in turn, shaped by the scarcity or abundance of resources); iii) *use* (e.g. nutritional value and food safety are shaped by the quality of the water, wild-foods, and fuel for washing and cooking used by residents); and iv) *stability* (e.g., seasonal variations affect nature's contributions to local diets).

ES contributions (direct and indirect) to food security, however, may have dissimilar effects on individuals within **households** and **communities** due to the differentiated needs and rights of access of specific social groups (e.g., men and women; poor and rich; the landless and large landholders, etc.). Furthermore, the potential impact of ES on people's **nutritional status** (assessed in terms of energy and protein intake, weight and height, etc.) is not direct. There is thus a need to distinguish and disaggregate potential and actual beneficiaries (users of an ES).

These different linkages are subject to continuous change due to impacts from **drivers** and **pressures**. Endogenous factors (i.e., pressures), like the growing demand for certain natural resources (e.g., timber) for commercialisation or self-consumption, may affect the provision of

ES (e.g., through deforestation). External drivers (e.g., increases in temperature or rainfall), in turn, may indirectly affect local uses of ES due to their impacts on ecosystems. These influential factors may lead to significant changes that push ecosystems over critical thresholds or **tipping points** (e.g., deforestation and climate change may result in the extinction of certain animal species).

Perversely, the pursuit of food security is not only dependent on ES but can itself be a driver of ES losses (e.g., through land clearance for agriculture and intensive cultivation practices). Trade-offs between obtaining food directly from forests or long-fallow shifting cultivation systems (which can maintain a range of other ES) and obtaining it from intensive mono-cropping or livestock ranching (which tend to diminish other ES) are influenced by factors such as government policies, the differential power of local stakeholders and the severity of food insecurity. These trade-offs are particularly evident at the **forest-agriculture interface**, defined as any area in which there is significant interdependence between tree-based and arable crops, sometimes with an important livestock component (Graves et al., 2001).

Food security can thus be considered an ideal ‘scenario’ to examine the complex interactions of multiple ES and dynamic transitions between forest and agricultural land uses.

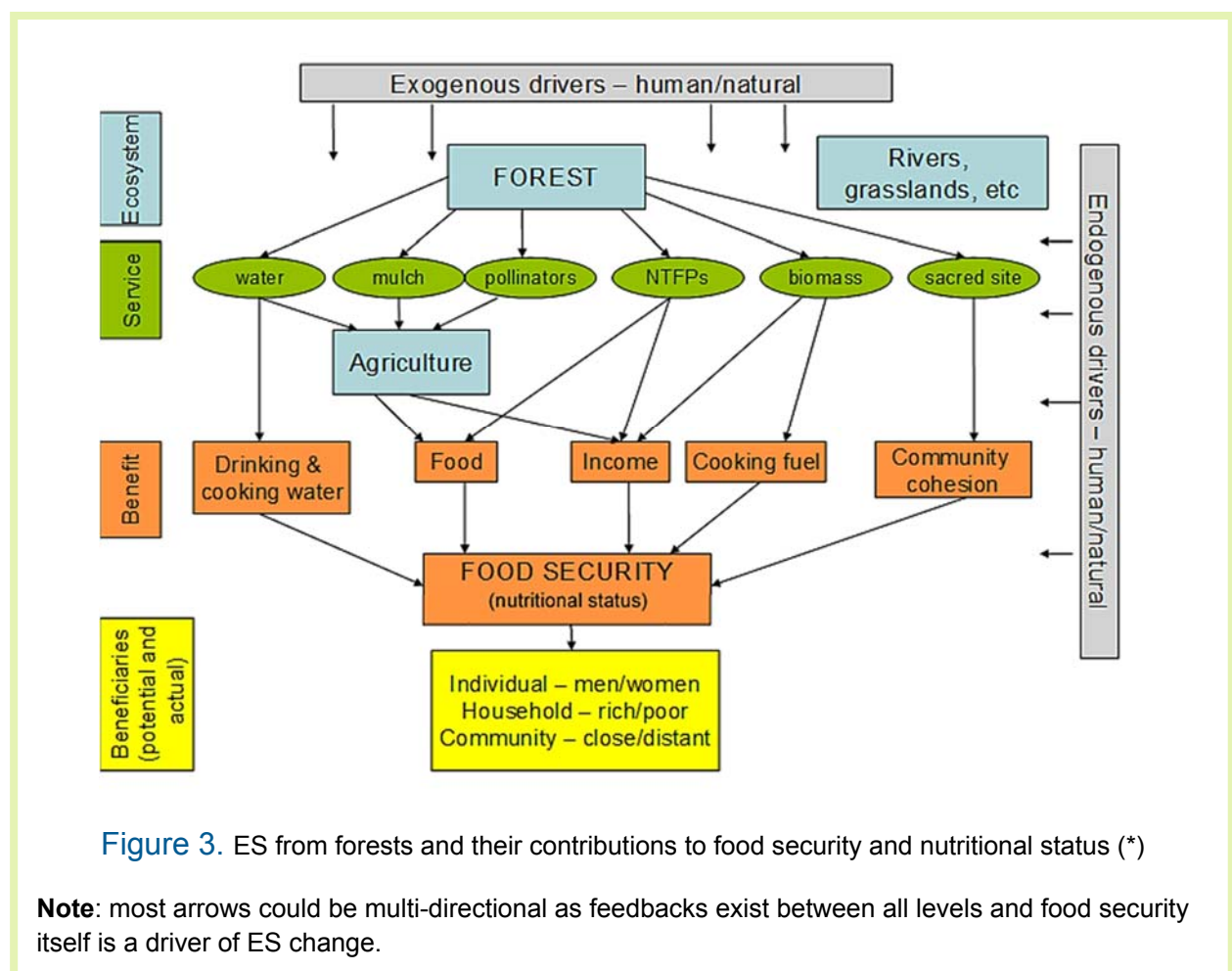


Figure 3. ES from forests and their contributions to food security and nutritional status (*)

Note: most arrows could be multi-directional as feedbacks exist between all levels and food security itself is a driver of ES change.

2. PRINCIPLES AND GUIDELINES

PRA practitioners need to take into consideration various key principles during the processes of data collection and analysis. Although these are numerous, the various precepts that guide good practice in PRA research can be aggregated into three broad themes (Chambers, 1997, 2008; Narayanasamy, 2009):

- i. Attitudes and Behaviour: PRA can be considered both ‘an attitude and method’; researchers need to adopt a mind-set that will allow them to see reality from a villager’s point of view.
- ii. Methods: PRA makes flexible use of visual / symbolic instruments developed collectively through inclusive groups from the community.
- iii. Sharing: PRA demands openness both between practitioners and between practitioners and informants.

2.1. Attitudes and Behaviour

a) *Reversal of Learning*

PRA demands from researchers and practitioners that they reverse their role; from one of knowledgeable, informed and trained ‘experts’ to one of ‘outsiders’ and uninformed ‘novices’. Research, in this scenario, progresses as a learning process in which the fieldwork team sees each activity as an opportunity to learn from the villagers, to understand their local situation, knowledge and cultural values and understandings. Emphasis should be placed on building rapport with the community by showing respect, answering questions, and generally showing interest and willingness to learn from residents’ testimonies and outputs.

b) *Handing over the stick*

A cornerstone of PRA is to offset the power imbalance observed in mainstream research contexts, where the interviewer or expert ‘imposes’ a specific set of structured questions on the informant. It is thus paramount that researchers let residents take the initiative and take control of the process of representation, description and explanation (Pretty et al., 1995).

The team will facilitate group discussion and guide it around the key topics of interest. However, participants should be able to freely contribute to the agenda of discussion and introduce any additional pieces of information and reflections they consider relevant. Likewise, group diagrams, mapping and ranking exercises (i.e., visual techniques) should be oriented by the PRA team but executed by participants. Symbols, materials, selection or ranking criteria should be defined and represented by residents in their own terms (e.g., using local material such as leaves, rocks, or seeds to represent different parts of their community).

c) *Self-critical Awareness – Reflexivity*

PRA practitioners need to examine their own behaviour continuously and critically reflect on it so as to identify areas for improvement in rapport building and data elicitation. They must see themselves as engaged in a continuous dialogue with ‘the other’, in a relationship in which both influence each other, thus moving away from top-down forms of inclusion, integration, and interpretation.

This process, also called ‘reflexivity’, aims to put the researcher in direct contact with his/her own subjectivities so as to close the gap with those of the researched. Three key tensions that should be addressed are: (i) differences in terms of *values, assumptions and taken-for-granted practices* (the result of personal development and social background); (ii) the *attitudes that local people adopt towards the study and its members*, by virtue of the expectations and assumptions they have (both of the visitors and the project); and (iii) *tensions between priorities*, between what the team consider important—due to scientific and professional interest—and what locals believe relevant (Finlay, 1998; Parker, 2004).

d) *Offsetting Biases*

Practitioners must avoid any kind of bias that could lead to exclusion of the most vulnerable groups by hurrying up the data-collection process or trying to come up with easy answers or depictions of local realities. PRA practitioners should invest time and resources in dealing with various forms of biases:

- *Spatial*: Look beyond areas of easy access (usually by the road) and explore those that are more isolated from mainstream society.
- *Personal*: Build inroads into the less talkative, less active social groups (usually worse-off and/or marginalised) rather than relying solely on key informants, leaders and their associated networks or the most vocal.
- *Gender*: Gender is a basic power differential in most communities. Women should be given equal opportunities to express themselves during PRA exercises.
- *Seasonal*: Try to get to know how rural lives change from one season to another (e.g., variations in food stocks or prevalence of illnesses) instead of relying on snapshots of community life.
- *Project*: Make an effort to listen to those who are less interested in the (research) project in order to examine more critical views and assessments of its proposals.

2.2. Methods

a) *Inclusive group work*:

PRA exercises constitute collaborative efforts in which informants not only describe their local reality but also discuss and analyse it. This approach provides two key advantages compared with one-to-one interactions: i) it covers topics in a broader fashion, by including participants’ different perspectives and experiences and ii) it can generate a more in-depth analysis since participants of dissimilar backgrounds can reflect on the differences between their respective circumstances, experiences and opinions.

It thus becomes critical that PRA exercises are conducted such that ALL participants have equal opportunity to contribute to the group work. Although some exercises demand a specific profile of participants (e.g., women-only groups), the team should be sensitive to any social, cultural, or economic differences within those groups. Efforts should be made to prevent individuals or groups from assuming a dominant role in the discussion (to the detriment of the most vulnerable). Furthermore, giving equal footing to local elites and disadvantaged groups may help to empower the latter (Chambers, 2008).

b) *Visual methods*

PRA makes extensive use of various forms of visual representations, such as symbols, maps, diagrams, etc. This approach facilitates a more inclusive and open environment, in which the illiterate and less articulate have more opportunity to participate. In addition, the

graphical representation of topics and issues can help local people to progressively depict more complex realities as they start visualising the diverse connections between them. Data-elicitation, then, can constitute an amenable task; a fun exercise that allows residents to show their creativity whilst promoting a greater proximity between them despite their socioeconomic or cultural differences.

In order to achieve these aims, it is necessary that these different forms of visual expression are developed locally. Symbols, diagrams, graphs and other visuals should be developed by the participants, using shapes, colours or local materials that participants consider easy to work with and that are meaningful to them.

c) *Seeking complexity and diversity*

PRA methods do not intend to outline a 'typical' profile of residents or communities based on averages. Rather than assuming that communities are homogeneous social units, PRA learns from 'maximising diversity' by looking for analytically relevant differences, outliers and contradictions (Kumar, 2002).

Aside from 'giving voice' to all participants within group discussions, this approach demands two additional considerations: First, where necessary, exercises should be repeated with different analytically relevant groups to attain a comprehensive and in-depth description of local realities (e.g., farmers and landless residents could provide rich complementary information on livelihoods-centred discussions). Second, the exploration of ideas and research topics should be conducted in a flexible manner. The tools and questions described in the present text are informed suggestions; they could be modified by practitioners when encountering new information or unexpected findings.

d) *Progressive and sequential learning*

PRA makes use of a variety of visual exercises and group discussions that are applied in sequence. A single type of data-elicitation is not considered enough to cover all the dimensions associated with a particular subject of study nor to prompt the kind of critical and empowering reflexive process pursued by participatory approaches (Kumar, 2002). Instead, PRA methods are implemented in a systematic manner, progressively adding different layers of complexity.

Participants are expected to engage in a collaborative effort of building up a complete picture of their local reality by continually adding and discussing more complete and detailed information. In this manner, they will be able to develop a more in-depth and comprehensive critical reflection of their own circumstances and those of their neighbours. Additionally, this systematic and iterative process can help practitioners to cross-check their different pieces of information, thus ensuring a greater level of validity in their findings.

To this aim, practitioners need to adopt two basic practices: i) they should share information between each other at the end of the day, discussing their new findings and key contradictory issues or outliers; ii) they should be ready to re-order the set of activities initially programmed as new findings and lines of enquiry emerge.

e) *Triangulation*

PRA data is collected through the use of more than one approach to data-collection. Different forms of cross-checking are thus possible, hence securing the validity and reliability of findings (Flick, 2004):¹

- ***Data triangulation:*** This refers to gathering the same type of information from different sources; it could imply working with different informants (e.g., poor and non-poor); at different times (e.g., summer and winter); or in different contexts (e.g., during an open community assembly or a private meeting).
- ***Investigator triangulation:*** This refers to the use of different facilitators to gather similar data or different researchers to interpret the same piece of information.
- ***Methodological triangulation:*** This refers to discussing the same topic using different data-elicitation techniques (e.g., participatory mapping and system diagram exercises on land-use and ES-benefits) (Fig. 4).

A particular topic or question could thus be discussed with different participants and facilitators as well as analysed through different data-collection methods (e.g., mapping, matrix scoring, diagrams, etc). This will allow the research team to verify testimonies, compare perspectives, gain insights on a subject, and achieve a more comprehensive understanding of the issue at a community level.

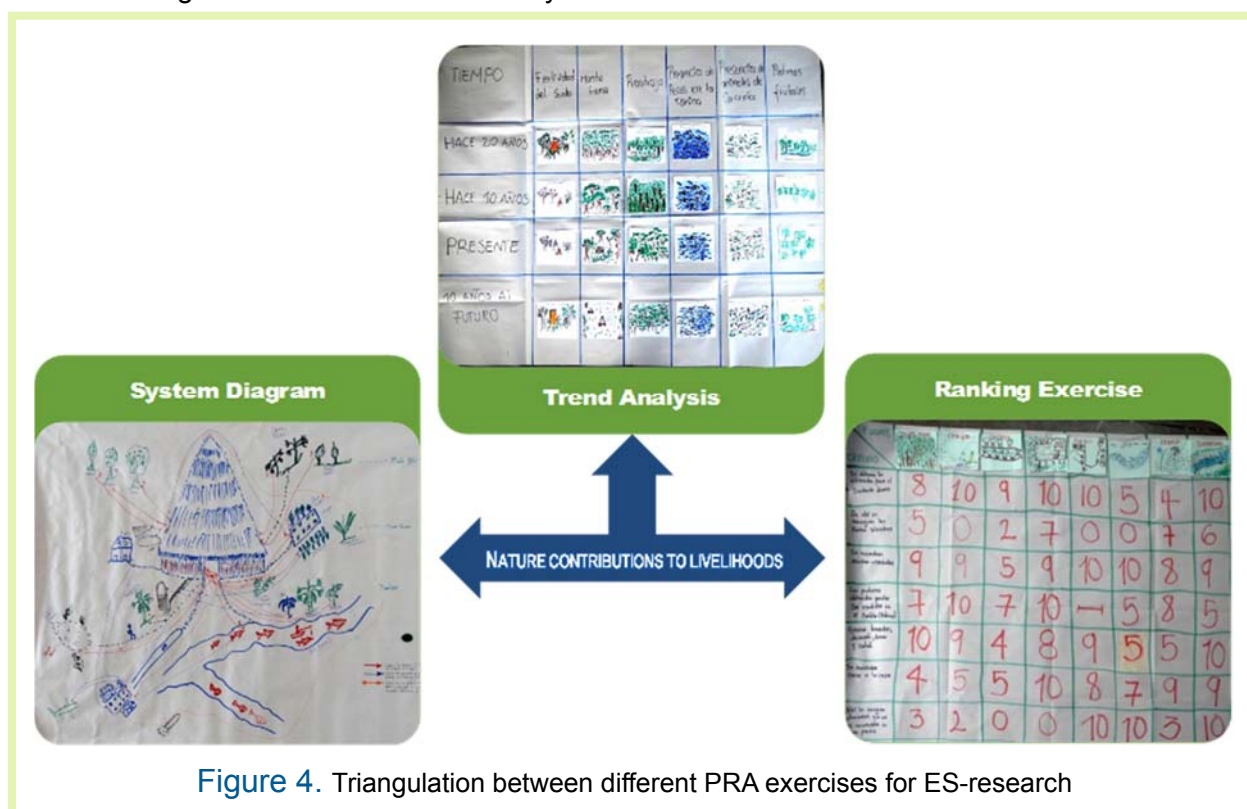


Figure 4. Triangulation between different PRA exercises for ES-research

¹ There are other types of triangulation; such as *discipline triangulation* (when members of different disciplines analyse the same data) or *theoretical triangulation* (when different theoretical frameworks are used to interpret the same information). Given that these are analytical tasks; they are not included in the core text. However, PRA's reliance on various sources and techniques to explore complex realities comprehensively makes it suitable for these other forms of triangulation (Kumar, 2002).

As a result, there is some overlap between the tools presented in this manual. The overlap between different sources of information also takes into account the fact that it is not always possible to get through all the desired questions in one exercise or with one set of people. When choosing your tools, make sure you have at least two different sources of information for each of the research outputs listed in Table 1.

f) *Using PRA in multiple communities*

For the purposes of research it is often desirable to compare between different case study communities. Although PRA exercises do include quantitative outputs and deal with common themes, they are essentially qualitative in nature, reflecting the perceptions of participants in one community. Great care should therefore be taken when comparing the results from different communities, even if these appear to be similar in terms of socio-economic and biophysical characteristics.

This is particularly true for exercises such as well-being ranking, where the conception of 'well-off' and 'poor' may vary greatly between communities, meaning that these categories are useful for a relative analysis within one community but direct comparison between, for example, the 'poor' in different communities is not straightforward. In the same way, the fact that participants in one village do not mention a particular ecosystem service or coping strategy does not mean that they are necessarily less important than in another community. It may simply be a result of the way the discussion was facilitated and the experience of the particular group of participants. If comparisons of this kind are desired then it is important to think about including prompts in exercises to ensure that the discussions in different communities all cover the same ground.

2.3. Sharing

PRA is guided by the principles of openness and transparency "among the people, between the people and (...) among practitioners" (Kumar, 2002, p. 38). Practitioners should thus be willing to share their findings and interpretations at all levels, particularly within the research context.

In this setting, sharing information has various implications: i) it facilitates building trust and rapport between researchers and residents; ii) this, in turn, allows for greater disclosure of detailed information and of personal experiences and perceptions; and iii) leads to a more comprehensive data-collection process and richer mutual learning efforts. In addition, iv) this open exchange of ideas generates more opportunities for cross-checking and corrections and so to more valid findings.

PRA's emphasis on a participatory learning process that empowers participants, however, implies looking beyond the data-collection context. Given that the PRA outputs have been produced by local informants, they are considered to belong to the local population.

Acknowledging local ownership to research findings is a core feature of sharing since it requires that the processed information be returned to the local population in a way that could be most useful to them and lead to some form of action.

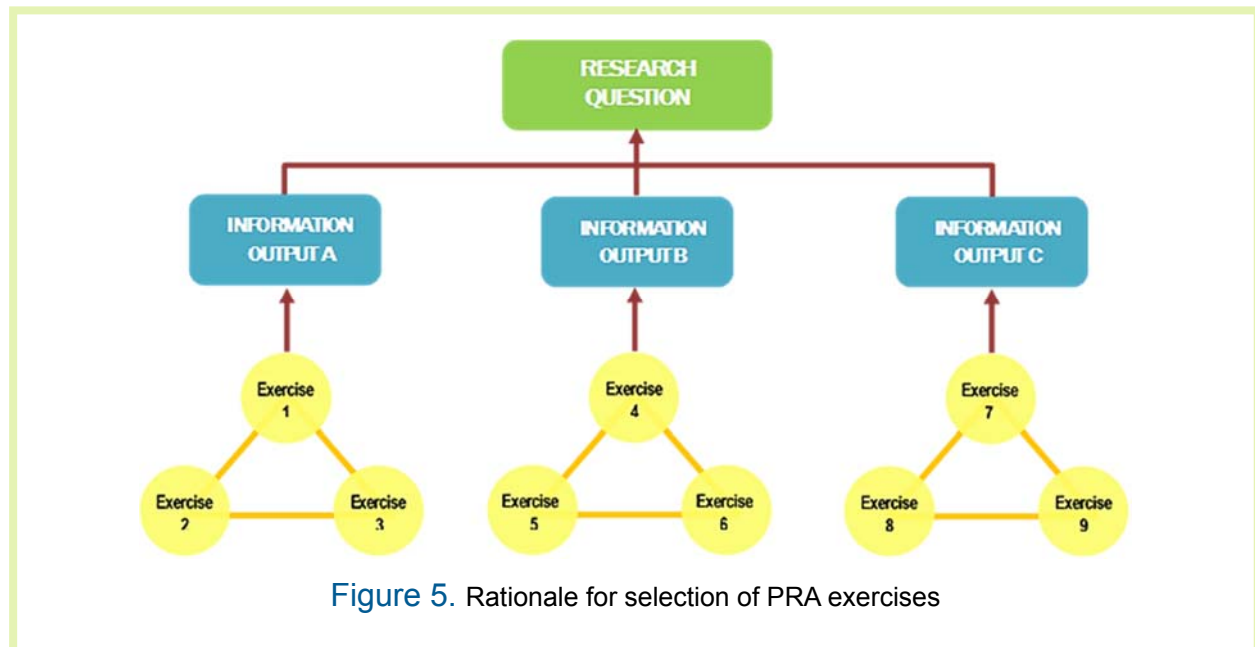
Returning the information to participants in clear and systematised form will strengthen the learning process that took place during data-collection; it will provide a printed record that the population can consult and use when required. In addition, possession of it will give locals the freedom to decide how best to use it to improve their conditions, hence facilitating the formation of bottom-up initiatives. It is useful to consult with local informants to ensure that desired information is returned to participants in a format that best suits their interests.

3. THE DATA-COLLECTION PROCESS

3.1. Selection of PRA exercises

This manual presents a series of participatory data-collection techniques that can be used to obtain local information on ES contributions to livelihoods and food security as well as their implications for natural resource management initiatives.

The PRA exercises presented here directly respond to each of the research questions discussed in Section 2. In order to answer them, valid and reliable information is needed, which is obtained following the principle of triangulation (Fig. 5). The complete list of information outputs and associated data-elicitation techniques is presented in Table 1.



3.2. The data-collection process

Data collection is conducted by means of individual semi-structured interviews, review of secondary data, focus groups and standard PRA exercises. These are organised sequentially and thematically in five main phases (Fig. 6).

a) Phase 1: Preparation for community consultation meeting

Before any data-collection takes place, the research team needs to make sure that the village to be visited is suitable for the research objectives of this study and that their leaders at all levels of local administration and population consider the research project useful to their particular interests and needs.

Table 1. Participatory data-collection tools used to provide the required information outputs for the ASSETS project's research questions

RESEARCH QUESTION	INFORMATION OUTPUTS REQUIRED	TECHNIQUES
<i>What are the current levels of direct and indirect contributions of ES to local livelihoods, food security and nutritional health of the rural poor?</i>	Local well-being 1.1 Outline of local definitions of 'well-being', 'wealth' and 'poverty' used by local residents. 1.2 List of (non)economic indicators that characterise local socio-economic groups. 1.3 Description of the socio-economic composition of the study areas.	<ul style="list-style-type: none"> ▪ Group discussion ▪ System diagrams ▪ Well-being ranking
	Local livelihood strategies 1.4 Description of local livelihood strategies (including farm and non-farm activities). 1.5 Description of seasonal variations in livelihood strategies. 1.6 Outline of within-household distribution of domestic and economic roles. 1.7 Description of seasonal variation in household income & expenditure, causes and overall balance. 1.8 Assessment of effectiveness of current livelihood strategies to attain adequate well-being and food security.	<ul style="list-style-type: none"> ▪ Group discussion ▪ System diagrams ▪ Well-being ranking
	Local food security conditions 1.9 Local definitions of 'food security' and 'food insecurity' and relevant indicators (at household and community levels). 1.10 Assessment of local food security: i) availability, ii) affordability, iii) access and iv) health & quality. 1.11 General description of within-household differences in terms of food security. 1.12 Description of seasonal variations in access to food.	<ul style="list-style-type: none"> ▪ Group discussion ▪ Seasonal calendar
	Local land use 1.13 Classification of main forms of land use. 1.14 Description of all land uses in terms of natural resources and main (non) productive uses. 1.15 Description of current land exploitation systems. 1.16 Spatial representation of local land uses.	<ul style="list-style-type: none"> ▪ Group discussion ▪ Participatory mapping ▪ Transect walks
	Direct ES contributions to food security 1.17 List of foods eaten in the study areas and their sources (including non-farm areas). 1.18 Ranking of local food sources and explanation of rationale for classification. 1.19 Description of seasonal variations in local diets and reliance on wild-foods 1.20 Description of any spatial effects over access to wild-foods and diets. 1.21 Description of any variations in access or use of wild-foods across local social groups.	<ul style="list-style-type: none"> ▪ Group discussion ▪ System diagrams ▪ Ranking & scoring ▪ Participatory mapping ▪ Transect walks

RESEARCH QUESTION	INFORMATION OUTPUTS REQUIRED	TECHNIQUES
What are the current levels of direct and indirect contributions of ES to local livelihoods, food security and nutritional health of the rural poor? (cont.)	ES-benefits and their contributions to livelihoods and well-being 1.22 List of ES used locally for farm and non-farm economic activities. 1.23 List of ES used locally for domestic and cultural activities. 1.24 General ranking of ES developed by local residents (with explanation of rationale). 1.25 Outline of perceived changes in the importance of ES benefits' contributions over time. 1.26 Outline of perceived differences in the importance of ES across local social groups 1.27 Outline of perceived differences in the importance of ES for various household members.	<ul style="list-style-type: none"> ▪ Group discussion ▪ System diagrams ▪ Ranking & scoring ▪ Participatory mapping ▪ Transect walks
	Sources and flows of ES-benefits 1.28 Spatial representations of wild-food sources and relevant flows for local use and trade. 1.29 Spatial representations of sources of ES used for farm and non-farm economic activities and relevant flows for local use and trade. 1.30 Spatial representations of sources of ES used for quotidian and cultural uses and relevant flows for local use and trade.	<ul style="list-style-type: none"> ▪ Participatory mapping ▪ System diagrams ▪ Transect walks
	Disservices 1.31 List of any negative effects from nature that affect local well-being. 1.32 Outline of seasonal variations in the prevalence of negative effects from nature. 1.33 Spatial representations of sources of ecosystems disservices.	<ul style="list-style-type: none"> ▪ Group discussion ▪ Participatory mapping ▪ Transect walks ▪ Seasonal calendar
	Natural resource management 1.34 Description of land tenure arrangements (at the community, household and individual levels). 1.35 Description of rights of access and forms of ownership over natural resources. 1.36 Description of challenges and threats to access and use of ES and land. 1.37 Description of community organisations for local management of territory / natural resources. 1.38 Description of the operational structures and decision-making procedures for key community organisations managing natural resources. 1.39 Description of influential governmental and civil society organisations shaping local management of territory / natural resources. 1.40 General depiction of relationship / effects between community and external organisations and general impact on the current state of local ecosystems / natural resources.	<ul style="list-style-type: none"> ▪ Group discussion ▪ Venn diagrams

RESEARCH QUESTION	INFORMATION OUTPUTS REQUIRED	TECHNIQUES
<i>What are the drivers and pressures that have the greatest effect on the ES that are most important for food security and health outcomes?</i>	<i>Changes in general well-being</i> 2.1 Outline of key changes in local living conditions and inequality issues in the recent past. 2.2 Outline of key factors driving changes in local living conditions for the recent past.	▪ Group discussion
	<i>Changes in livelihood strategies</i> 2.3 Description of significant changes in local livelihood strategies in the recent past. 2.4 Outline of key factors driving changes in local livelihoods in the recent past.	▪ Group discussion
	<i>Changes in land-use</i> 2.5 Description of key changes in local forms of land use in the recent past. 2.6 Outline of key drivers leading to changes in land use (external and internal). 2.7 Outline of perceived effects of changes in land use over the provision of ES.	▪ Group discussion ▪ Trend analysis ▪ Participatory mapping
	<i>Changes in food security</i> 2.8 Depiction of perceived changes in terms of overall food security for the recent past. 2.9 Description of key factors driving changes in local food security.	▪ Group discussion ▪ Trend analysis ▪ Community timeline
	<i>Changes in ES contributions to food security</i> 2.10 Outline of changes in the supply of wild-foods. 2.11 Description of key factors driving changes in the provision of wild-foods. 2.12 Description of the effects of perceived trends in the provision of wild-foods.	▪ Group discussion ▪ Trend analysis ▪ Cause-effect diagrams
	<i>Changes in ES contributions to livelihoods and material well-being</i> 2.13 Outline of changes in the supply of ES for livelihood strategies. 2.14 Outline of changes in the supply of ES for domestic / cultural activities. 2.15 Description of the direct and indirect drivers that affect ES provision. 2.16 Description of the effects of perceived trends in ES benefits for livelihoods and well-being.	▪ Group discussion ▪ Trend analysis ▪ Cause-effect diagrams
	<i>Changes in ES disservices</i> 2.17 Depiction of perceived changes in the prevalence of negative effects from nature over time. 2.18 Description of key (external and internal) factors identified as driving changes in presence of disservices.	▪ Group discussion ▪ Trend analysis

RESEARCH QUESTION	INFORMATION OUTPUTS REQUIRED	TECHNIQUES
<i>To what extent are coping strategies to food insecurity dependent on ES over multiple spatial and temporal scales?</i>	Coping Strategies (CS) 3.1 Description of all coping strategies used locally to deal with food scarcity. 3.2 Ranking of CS according to their severity and explanation of rationale to differentiate between levels of severity. 3.3 Outline of spatial and social factors affecting households' capacity to adopt CS.	<ul style="list-style-type: none"> ▪ Group discussion ▪ Cause-effect diagrams
	ES contributions to Coping Strategies 3.4 List of wild products used in times of food scarcity and their main sources in the local landscape. 3.5 Outline of the main factors, social, spatial or environmental limiting households' capacity to access sources of wild-foods used for CS.	<ul style="list-style-type: none"> ▪ Group discussion ▪ Cause-effect diagrams
	Changes in Coping Strategies 3.6 Description of historical changes in local CS. 3.7 Outline of the main factors driving changes in the adoption of CS over time. 3.8 Assessment of how changes in CS over time are related to changes in ES.	<ul style="list-style-type: none"> ▪ Group discussion ▪ Cause-effect diagrams ▪ Community timeline
<i>How are the levels of direct and indirect contributions of ES to local food security and nutritional health out-comes for the rural poor likely to change under future land use and climate change scenarios?</i>	Visions of the future 4.1 Description of visions of the future (10 years) for land use and of the rationale used. 4.2 Description of visions of the future (10 years) for provision of wild-foods and of the rationale used. 4.3 Description of visions of the future (10 years) for availability of ES and recurrence of disservices and of the rationale used.	<ul style="list-style-type: none"> ▪ Group discussion ▪ Trend analysis ▪ Cause effect diagrams
<i>How can the risks associated with future environmental change be managed to minimise effects on human beings and ecosystems?</i>	Responses and adaptations to trends 4.4 Description of forms of local adaptation implemented by residents in response to changes in land-use, provision of ES and prevalence of disservices. 4.5 Description of current responses and interventions conducted in the area by communities and external actors to address ES provision and food security issues 4.6 Description of past initiatives to manage or redress perceived changes in ES and food security, either from the community or external actors.	<ul style="list-style-type: none"> ▪ Group discussions ▪ Cause-effect diagrams ▪ Community timeline
	Potential future responses 4.7 Description of potential future responses from organised communities and forms of support required. 4.8 Outline of potential external interventions that the communities need to address / redress the reported changes in ES.	<ul style="list-style-type: none"> ▪ Trend analyses ▪ Group discussion

After the potential study sites have been selected, the research team needs to present the project and explain the data-collection process to the population in general (do not assume that coordination only with local authorities will suffice). This will ensure that residents will be engaged in the study from the beginning and that any initial doubts and concerns will be addressed, hence preventing the emergence of substantial misinterpretations later on.

▪ **Activities:**

- Ⓐ Secondary data review: demographic data (e.g., from censuses); socioeconomic data from previous studies; reports from forest departments, agricultural offices, etc.).
- Ⓑ Semi-structured interviews with key informants: community authorities (traditional and formal), government officials, local NGO staff, etc.
- Ⓒ Community consultation meeting: The presentation should include the project's objectives, parties involved, data-collection methods, data-management and outputs to be generated. Discuss with participants the compensation policy to be adopted for informants and the potential benefits that the community, as a whole, may obtain in the future (see guidelines in Section 6). If there will be no obvious or material benefits (other than the information shared from the research processes), make that clear.

- **Estimated time**: Initial semi-structured interviews may take up to 3 days depending on availability of key informants. Community assemblies may take half or a complete day, depending on local customs.

- **Observations**: Initial interviews should be conducted with enough time to process the information collected so as to examine the suitability of the village and the interest local people.

Do not rely only on a verbal presentation for the community assembly. Prepare information sheets and dissemination material (e.g., posters and leaflets) that make the information accessible to the population in general.

b) Phase 2: Livelihoods and land-use

This is the start of the core primary data-collection process. The different activities in this stage aim to give us a general understanding of the socioeconomic and bio-physical characteristics of the study site, with emphasis on the relationship between local livelihoods and land-use.

▪ **Activities:**

- Ⓓ Well-being and livelihoods: Group discussion on indicators of poverty and wealth, socioeconomic structure of the community and description of local productive activities.
- Ⓔ Well-being ranking: Ranking exercise of households according to their material well-being.
- Ⓕ Household system diagram: System diagram exercise and group discussion on sources of inputs for (non)farm productive and daily activities and destination of outputs of productive activities.
- Ⓖ Participatory land-use mapping: Participatory mapping exercise on key features of the communities.

- ⒣ Focus group on land use: Group discussion on land tenure rights and farm management systems.
 - ⒥ Participatory GIS mapping: A geographically accurate mapping exercise based on local information on land use.
 - ⒦ Transect walks: Direct visit of relevant landscape areas of the community and description of main topographical and bio-diversity features as well as economic use and tenure.
 - ⒦ Trend analysis on land use: Review of changes in the predominant forms of land use and visions of the future (10 years).
- **Estimated time**: 3 to 4 days, depending on the number of groups of informants consulted and on whether or not they are being conducted simultaneously or sequentially.

c) Phase 3: Food Security

This second stage of data-collection should begin AFTER the first set of exercises has been completed. These activities aim at understanding various food-security related issues: seasonal variations in livelihoods, health and access to food; local definitions and assessments of food security; identification of non-farm areas that are used as sources of food; discussion on the causes and effects of food insecurity and description of the various manners in which residents deal with food scarcity.

- **Activities:**
 - Ⓐ Seasonal calendar: A visual representation of agricultural calendars and other productive activities. It is complemented with information on expenditure and health.
 - Ⓜ Focus group on food and food source matrix: Group discussion aimed at identifying all types of foods consumed locally and their respective sources, including wild-foods as well as assessments of local conditions.
 - Ⓐ Trend analysis on wild-foods: A matrix scoring exercise that quantifies changes in stocks of wild foods and promotes a discussion on potential causes.
 - Ⓐ Participatory mapping of wild-food sources and flows: Spatial representation of sources and flows of wild-foods that are key components of local diets.
 - Ⓐ Focus group on food security: Group discussion on understanding and indicators of food security and insecurity.
 - Ⓐ Cause-effect diagram on food insecurity: Visual exercise aimed at identifying the drivers and pressures leading to food insecurity problems in the area and their respective impacts on local well-being.
 - Ⓐ Community timeline on food (in)security: A timeline representing the historical trajectory of the community, registering key events and their respective impacts on food security.
 - Ⓐ Coping strategies Focus Group: Group discussion on how people deal with food scarcity and the different measures they adopt according to the severity of this problem.
- **Estimated time**: 3 to 4 days, depending on the number of groups you need to work with and on whether exercises take place simultaneously or sequentially.

d) Phase 4: Ecosystem Services

These exercises focus on the contributions from nature that are relevant for productive and daily activities (aside from food). This does not imply a clear separation from the previous set of exercises, ES may contribute to food security indirectly, either by generating income or setting up the necessary conditions for consuming quality meals (e.g., access to clean water).

- **Activities:**

- ① Focus group on ecosystem services for livelihoods: This exercise attempts to identify all key ES that are essential to local productive activities and domestic practices. It includes a discussion on changes in stocks over time and potential causes of change.
- ② Participatory mapping of ES sources and flows: Spatial representation of sources and flows of ES relevant to local livelihoods and domestic practices.
- ③ Cause-effect diagram on ES: Identifies the direct and indirect drivers of key changes in the provision of ES for local livelihoods and their consequences.
- ④ Matrix Scoring exercise on ES benefits: Participants are asked to rank all possible ES so as to identify those that are most essential to local well-being.
- ⑤ Venn Diagrams on natural resource governance: Exercise that aims to identify all key community based organisations as well as those from the government and civil society that influence the management of natural resources. It includes discussions on decision-making processes, accountability, stakeholders and potential future activities.

- **Estimated time:** 2 to 3 days, depending on the number of groups you need to work with and on whether exercises take place simultaneously or sequentially.

- **Observations:** This last group of exercises demands good understanding of local socioeconomic and environmental conditions. Make sure to review the findings from previous stages of data-collection so as to avoid repetition and to adapt the discussion topics to issues of local interest.

e) Phase 5: Feedback meeting with communities

- **Activities:**

- ① Feedback meeting with communities: Open meeting with residents where summarised key findings are presented for discussion and validation.

- **Estimated time:** Up to one day depending on local customs.

3.3. Data-collection protocol

- a) **PREPARING THE TEAM**. Make sure that all team members are fully briefed about the objectives of the research, the project's risk assessment procedure, and have received appropriate ethics training. They should know:

- How to explain the objectives of the project to local participants. Importantly, this includes being very clear about the possible benefits of the research to the community or individuals (distinguishing this research project from development projects participants may be more familiar with).

- How to use the information and consent forms in Section 5 to obtain informed consent from participants.
 - How to deal with any difficult issues they may come across. These may range from participants being upset by topics being discussed (e.g. hunger) to some participants dominating others or simply getting bored and walking away. When working in remote and impoverished areas, the team should also be briefed on how to respond to requests for help (transport, medications, food, etc.) from participants.
 - Who to refer participants to if they are unhappy with any part of the research process.
 - What to do if a team member or participant is hurt or is taken ill.
- b) Making use of the preliminary data collected for each village (Exercises A and B), the lead researcher should brief the fieldwork team about the main socioeconomic and ecological features of the village and other issues of consideration (e.g., culturally acceptable practices).
- c) A named member of the fieldwork team should be allocated responsibility for putting together all the data obtained from a village. This person should be in charge of compiling all material produced, including photos and audio files, and handing them over to the lead researcher.

It is recommended that this person keeps a diary of events, which details the dates, times, and key features of the fieldwork process (e.g., logistical challenges).

- d) **BEFORE** conducting a new exercise or interview:
- The team should prepare for each exercise by reviewing all the relevant information from previous exercises and secondary data sources (e.g., the results from the participatory mapping exercise and some historical maps should be consulted before conducting the focus groups on land use).
 - The team should review the research outputs they are expected to produce from each exercise (See the 'Why?' section in the instructions for each exercise) and the corresponding topic guides for group discussion (See the 'How?' section).
 - Assign a lead and a supporting facilitator for each exercise.
 - The lead facilitator should work with the lead researcher to coordinate the logistics involved for the exercise they will conduct. Review the 'What with?' section in the exercise instructions to check the materials needed.
 - Selection of participants: Review the 'Who with?' section in the exercise instructions to verify the social, economic or cultural profile of participants required for each exercise.

At the beginning of the data-collection process you can rely on the information obtained from key informants and local authorities to invite suitable residents to the first exercises. However, after the first exercises have been conducted (Well-being Ranking of households: Exercise E) and the team's local knowledge increases, they should be more directly involved in the selection of informants for subsequent events.

Be aware that participants must be invited, not ordered, to attend. Make sure that when coordinating with local authorities, the latter do not force anybody to participate.

Try to vary the group composition from one exercise to another. Although some PRA exercises are interrelated, there is no need to rely on the same set of informants.

- Timing and location of the exercises: Remember that people's time is valuable so arrange exercises at a time and place to suit their needs. Provide transport (or cover costs) if necessary and try to keep exercises shorter than two hours. If the activity takes longer than two hours, provide refreshment, a meal or other compensation as agreed in the project's compensation policy (See Section 5.4).

e) **DURING** the exercises or interviews:

- Informed consent should be obtained from participants at the beginning of each group exercise or interview. The necessary forms are provided in Section 5. Proceed as follows:
 - i. Make sure all participants are well informed about the project (e.g., its objectives and parties involved), their rights as informants (e.g., to refuse to answer some questions, risks and benefits, if present), as well as the research outputs planned.
 - ii. For individual key informants, read the consent form with them and ask them to initial the corresponding boxes detailing their agreement with the study policies. Ask them to sign the form or record verbal agreement (Section 5, 'Consent Form for Key Informants').
 - iii. For participants in PRA group exercises, use an oral consent form. The form should be read out at the start of the exercise and consent recorded on a dictaphone AND witnessed by another researcher. Participants' names should be recorded at the bottom of the sheet with signatures if participants are literate, verbally if illiterate (Section 5, 'Oral Consent Form').
- It is the responsibility of the lead facilitator:
 - to make sure the necessary material is available for the relevant exercise;
 - to guide participants during the visual exercises and group discussions; particularly by reminding them of the topic and specific issues we would like to know more about;
 - to take written notes of the discussion and events;
 - to coordinate the implementation of any compensation agreed with the local population for their participation.
- It is the responsibility of the supporting facilitator:
 - to take notes of the group discussions but in a more structured manner (by topic or question);
 - to remind the lead facilitator of questions in the topic guide (but this does not imply following them strictly or using the questions verbatim);
 - to ensure that the digital recorder is working throughout the exercise and it is placed in a suitable location. Remember, however, that participants have the right to request that you stop recording at any time.
 - To take photographs of all the material produced during the exercise.

f) **AFTER** completing the exercises:

- The lead and supporting facilitator(s) should meet to produce a field report in which they summarise the main findings for each of the topics presented in the topic guide

and any other that was included by the informants. To this effect, they should compare their notes, review the charts and tables generated, and listen to the recording of the group discussion.

- Before handing over the flipcharts to the lead researcher, the facilitators must catalogue the materials produced. Write down the following information on the backside of the flipchart: (i) the village name, (ii) type of exercise and the (iii) social group represented (e.g., men or women). If many flipcharts were used, number each page used.
 - Be aware that participants' names should not be included in any of the outputs generated so as to guarantee them the necessary confidentiality. The identity of participants can only be recorded in the corresponding consent forms.
 - Hand over the consent forms to the lead researcher.
 - Hand over the digital files containing the pictures and recordings obtained during the group exercises.
- g) The lead researchers should keep all consent forms, flipcharts, and written field reports in a locked cabinet. Audio-visual digital files should be kept in a password-protected computer. Always make copies of diagrams.
- h) After all the field reports have been filled in for each exercise, the person responsible for a given village should compile all the different reports into a single document and verify that all the produced material has been duly returned to the lead researcher. Depending on the scale of the research (number of exercises), this is not a trivial undertaking and enough time should be allowed for it to be completed properly before the team moves on to the next study site.
- i) Field reports for each exercise should be typed up. Each PRA exercise should be associated with an individual file. Once the information has been typed in, name the file in a consistent manner for identification purposes: VILLAGE NAME - EXERCISE NAME - SOCIAL GROUP (e.g., "Masaka - Seasonal Calendar - Women.doc(x)"). Files should be kept in different directories according to village.
- j) All digital files produced during a given exercise (recordings of interviews, pictures of flipcharts, scanned maps or transparencies, etc.) should be named containing the following information: (i) the village name, (ii) exercise name, (iii) type of document (maps, pictures of landscape, pictures of charts, etc.), and (iv) number of file (more than one version of a map, chart, or audio files may be generated for a single exercise). For photographs, the name of the author (photographer) should also be included in the file name. Given the need to store the outputs of publicly funded research in a public data archive after completion of the project, particular attention should be paid to consistency in the preparation and labelling of the files.²
- k) A feedback meeting should be organised in order to return the information obtained to the communities. In addition to presenting our key findings to local authorities provide some form of printed dissemination material (e.g., leaflet, poster) and summarised report containing the key findings of the study to the community.

² Advice on how to prepare social survey data for archiving can be found at:
http://www.espa.ac.uk/files/espa/Sharing%20social%20data_0.pdf

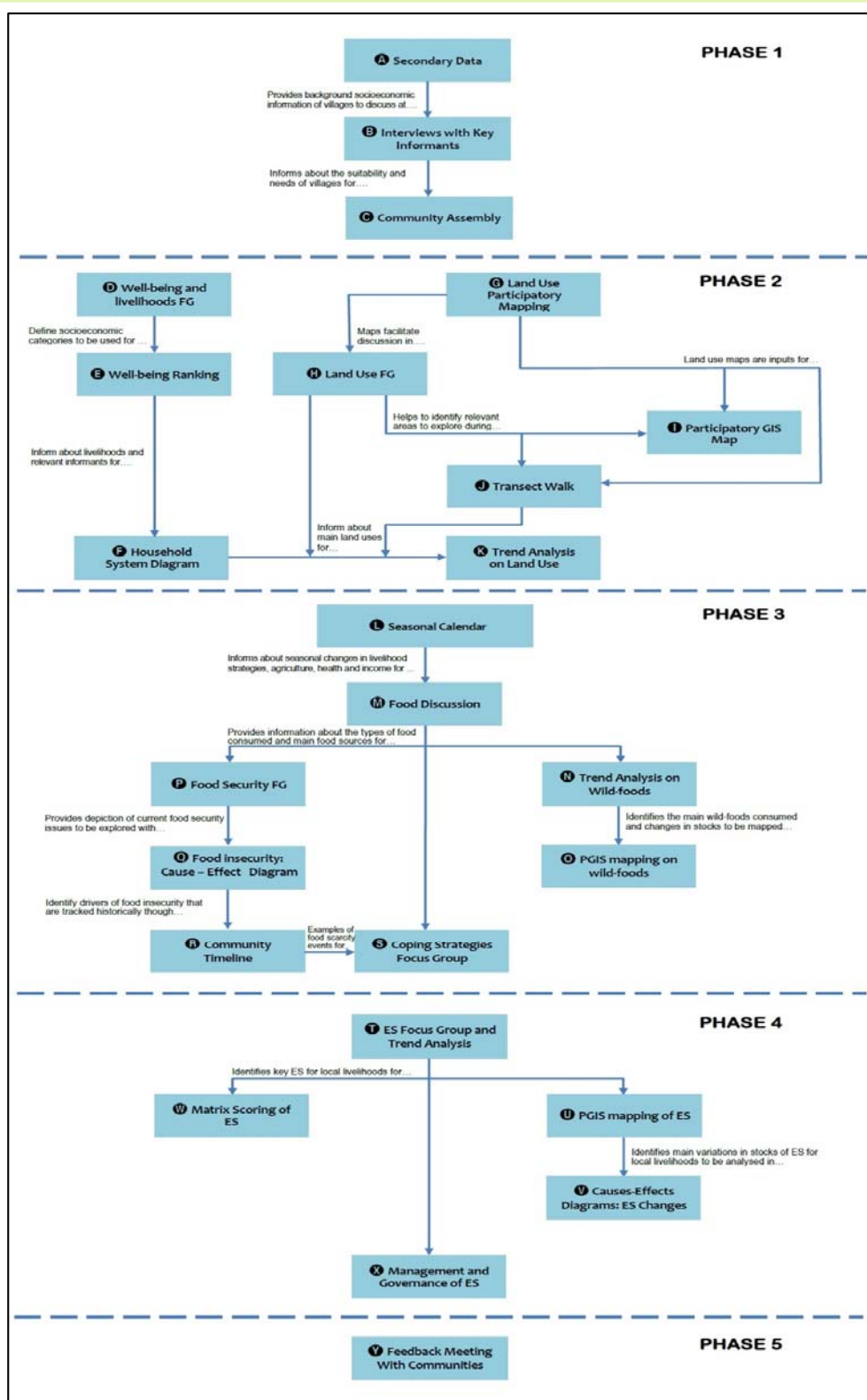


Figure 6. The data-collection process

4. PARTICIPATORY EXERCISES

4.1. Exercise A: Collecting Useful Secondary Data

Why?

This will serve to provide background information for case-selection purposes and to help answering some of the research questions (Table 1):

- To describe livelihood strategies within and beyond case study communities.
- To describe land use practices for livelihood purposes within and beyond case study communities.
- To describe seasonal variations in livelihood strategies, food security and health condition in case study communities.
- To outline the formal natural resource governance structures operating in the study area.
- To spatially locate sources and flows of relevant ES within and beyond the case study communities.
- To identify current conditions and trends in supply and demand of ES.
- To identify (in)direct drivers affecting current trends of ES.

How?

1. One person should be responsible for collecting together materials relating to each community.
2. This person should look for the following types of material:
 - ☒ Household lists.
 - ☒ Maps (historical as well as current) and aerial photos (if available).
 - ☒ Climatic information.
 - ☒ Forest inventories.
 - ☒ Reports by other projects or local authorities.
 - ☒ Theses / dissertations.
 - ☒ Census information.
 - ☒ Journal articles.
 - ☒ Newspaper reports.
 - ☒ Community documentation (e.g. forest management plans, administrative records, etc.).
3. A literate member of a community may be contacted to help with the collection of materials available locally (e.g., school enrolment figures, list of households).
4. A reference list of all the materials should be compiled. References should detail the institution from which the document was obtained. Where possible, keep a hard copy of documents/maps.
5. Extract data related to the information outputs required for each research question as detailed in Section 3 (Table 1). See if they provide information on any of the questions listed and share the key findings with the team. Ideally, this should happen before the community level work.
6. Collection of secondary data should continue throughout the duration of the project as the team finds out about more secondary data sources.

4.2. Exercise B: Key Informant Interviews

Why?

Interviews will provide preliminary information about the general socioeconomic context within study sites. This will ensure that we are aware of any sensitive or contentious issues (e.g. boundary disputes or illegal resource extraction activities) before fieldwork whilst also contributing to information outputs:

- To identify and describe livelihood strategies within and beyond case study communities.
- To identify and describe current uses of land for livelihood purposes and land management systems within and beyond case study communities.
- To identify seasonal variations in nutritional and health condition of residents.
- To describe existing rights of access to and ownership of local natural resources.
- To outline the formal natural resource governance structures operating in the study area.
- To identify current conditions and trends in supply and demand of ES.
- To identify (in)direct drivers affecting current trends of ES.

Who with?

- Leading villagers, who are knowledgeable about the community, such as chiefs, their assistants or representatives of local organisations (e.g., farmers or religious associations).
- Government officials working in the village (e.g., health professionals based in the area or local community development workers) and those whose responsibilities include overseeing activities that affect the community (e.g., district-level authorities of the Agriculture and Food Security Ministry). Officers from NGOs or other civil society organisations working in the area.
- Residents with no formal authority but who possess rich local information (e.g., religious leaders, traders, healers, or older residents).

How?

1. Informants can be interviewed separately and/or in a small group.
2. Hold the interview in a quiet place with no other people around, so as to guarantee privacy.
 - ☑ You may cover the following topics, depending on the expertise of the informant:
 - ☑ Community history (political, economic, cultural and ecological).
 - ☑ Main ethnic/religious groups and presence of any related form of segregation or conflict.
 - ☑ Current population level and trends (migration issues or increase in mortality rates).
 - ☑ Migration issues: prevalence of permanent and seasonal migration, profile of migrants (men or women, young or old, etc.) and any reports of immigration.
 - ☑ Poverty levels in the district.
 - ☑ Food security and nutritional status of community members.
 - ☑ Current tenure and decision making power over each land use type.
 - ☑ Main livelihood strategies in the community and dependence on ES.
 - ☑ Description of the direct contributions of forests and other natural resources to food security.
 - ☑ Internal/external drivers of food insecurity and nutritional outcomes.

- ☒ Main changes in land use and the provision of ES over time.
 - ☒ Internal/external drivers of changes in land use and ES.
 - ☒ Potential forms of intervention (at the local, regional and national level) to control or redress trends in ES negatively affecting people's livelihoods, food security and health.
- 3.** Towards the end of each interview ask informants if they have any questions or observations.
- ☞ Be aware that it may not be possible to cover all items in a single session and that more than one meeting may be required with informants.

4.3. Exercise C: Community Consultation Meeting

Why?

- To present the project's research plans to the community.
- To agree on a compensation policy with local residents.

Who with?

It is essential that the community makes an informed decision about taking part in the research. This meeting should therefore be held with a group of community members who are sufficiently representative of the community as a whole. These may include:

- Chiefs and other formal community-level authorities.
- Representatives of various local associations (farmers', religious, and women's organisations).
- Members of the community who do not hold a formal leading position in the community but are influential: elders, heads of large families, healers, shop-owners, etc.
- ☞ Make sure to use the background information collected through **exercises A and B** to invite all relevant residents. If some feel excluded, they may undermine the research project at a later stage.

How?

1. Follow local practice (e.g. organise a large meeting if it is customary for communities take decisions in large assemblies or talk to the village elders if they are the main decision-makers).
2. Prepare dissemination and presentation material in advance. Provide copies of a project information leaflet to ALL participants before introducing the project.
3. Cover the following topics:
 - ☑ The research objectives of the project.
 - ☑ The parties involved in the research, including funding institutions.
 - ☑ The main data-collection activities to be conducted during the fieldwork process.
 - ☑ Detail the length of time required for data-collection and the potential numbers of people to be involved.
 - ☑ Describe any subsequent research activities that will take place after participatory methods (e.g., household surveys).
 - ☑ Explain the rationale used to select the community for the research.
 - ☑ The intended uses for the data collected.
4. Discuss with informants how information will be given back to the community. Enquire how the study may overlap with some information needs of the community so as to confirm what format would be most useful to them.
5. Make absolutely sure that the participants understand that this is not a development project. Explain, however, that research projects may help the community take more informed resource management decisions as well as contributing to better policies at the regional level.

6. Discuss the compensation policy to be used in the area. Agree on a procedure that is considered suitable and can be administered in a transparent manner.
7. Make explicit the commitment of the research team to organise a feedback meeting with residents and local authorities in order to return and validate the information collected.
8. Provide the contact details of the local project member who can provide more information after the meeting.
9. Agree on the starting date for the research.

4.4. Exercise D. Well-being and Livelihoods Discussion

Why?

- To outline the concepts of 'well-being' used by residents.
- To establish a list of (non)economic indicators that characterise different local socioeconomic groups and describe the village's socioeconomic composition.
- To describe local livelihood strategies (including farm and non-farm activities) and assess their effectiveness.
- To describe main forms of land use for productive activities.
- To identify any (in)direct contributions of ES to livelihoods and food security.
- To identify any seasonal variations in livelihood strategies / economic practices.
- To describe significant inter-annual changes in livelihood strategies and perceived causes.
- To outline current rights of access to and ownership of local natural resources.

Who with?

- We recommend working with a representative cross-section of the community. The discussion group should therefore include members of different social, economic, and cultural groups.
- As you may not know which residents are particularly relevant for a livelihood analysis, make sure to consider the most typical variables:
 - Wealth: Well-off and very poor participants (e.g., large landowners and landless residents).
 - Occupational profile: Farmers, traders, fishers and other dominant economic sectors.
 - Gender: Men and women.
 - Cultural: Members of ethnic or religious based-groups.
 - Geographical: Residents living in different parts of the village.
- ☞ Make sure to work with 'viable' groups. This means
 - They should not be too small (i.e. at least 4 people) nor too large (i.e., no more than 20 people).
 - Be cautious with regards to mixing groups or individuals that are in conflict (e.g., antagonistic ethnic or religious groups).

What with?

- A spacious area / room.
- A flipchart or board. Alternatively, you can use cards.
- Writing / drawing materials of different colours (at least 3).
- A camera to register the material produced.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise to participants. Mention that you want to learn about the following:

- ☑ How do people make a living in the area?
 - ☑ How do people know who is rich or poor?
 - ☑ How does nature affect the manner in which people make a living in the area?
2. Discuss participants' understanding of 'wealth', 'poverty' and 'well-being'. The following prompts may be helpful to probe their views:
 - ☑ What do you understand by 'wealth'?
 - ☑ Are there any members in the village who can be called 'poor'?
 - ☑ What are the key characteristics that define someone as 'well-off' or 'very poor'? (Use local terms if these are preferred for describing socioeconomic condition).
 - ☑ How do residents define 'well-being' in terms of material possessions? (e.g., land or livestock)
 - ☑ What aspects other than money or material possessions are associated with 'well-being'? (e.g., education, membership of certain organisations, being friends with public officials, etc.).
 3. Let people talk freely and take notes of all the indicators and features they identify and discuss. Look for common indicators, such as quality of house, ownership of livestock, land ownership, size of farm, access to the market, etc., and make a list of these criteria.
 4. Write the criteria in the first column of a table on flipchart paper or the board. If most participants are illiterate, use drawings or symbols.
 5. Ask the participants to define three or four well-being groups using the indicators they consider most relevant in their community and write these across the top of the table. If they wish to do so, participants may attribute names to each group.

[NB. If working in many communities, it is useful to decide in advance whether you wish to have a fixed number of well-being groups in each community or leave the choice up to participants. See **Exercise E** for more discussion on this.]
 6. For each of the well-being groups identified, review the value of the different criteria and capture this information by writing or drawing in the table or using cards on the ground.
 7. Ask participants to identify the main productive and income generation practices conducted by these groups.
 8. Ask participants to estimate the proportion of residents that belong to each category.
 - ☞ If, as you progress with the table, you notice that two categories have similar identifying features, discuss with the group whether it is worth keeping them as separate categories or not. Similarly, indicators which do not distinguish between the groups should be removed.
 9. Review the table with the participants to make sure they agree with its content.
 10. Discuss the results:

Local well-being and livelihoods

- a) Which of the items listed do participants consider the most important to define a household's condition? Why?
- b) Which of the resources that people own are the most important in determining how people make a living (e.g., farm equipment, land, education, political involvement, etc.)? Why?
- c) To what extent does the way people make a living vary across seasons? Why?
- d) Which socioeconomic groups are the most affected by seasonality issues? Why?

CRITERIA	'Well-off'	'Better-off'	'Poor'	'Very Poor'
Living conditions	<ul style="list-style-type: none"> Permanent house. Walls and roofs made of bricks and concrete. Walls are plastered and painted. House has glass windows. House is usually well-preserved and clean 	<ul style="list-style-type: none"> Permanent house. Walls made of bricks and concrete but not plastered. Most roofs are made of iron-sheets. Some have glass windows. House in good condition. 	<ul style="list-style-type: none"> Semi-permanent house (seasonal migration). Walls made of mud bricks (no cover). Some roofs are made of iron-sheets but most of thatch. House is moderately preserved. 	<ul style="list-style-type: none"> Semi-permanent or temporary residence (tenants). Houses made of mud bricks or reeds / timber. Thatched roofs. Bad condition.
Farmland	<ul style="list-style-type: none"> Over 10 hectares (owned). Irrigated farmland. 	<ul style="list-style-type: none"> Between 5 to 10 hectares (owned). Irrigated farmland and some rain-fed farmland 	<ul style="list-style-type: none"> Between 1 to 5 hectares (some rented). Mainly rain-fed farmland. 	<ul style="list-style-type: none"> Less than 1 hectare (mainly rented). Rain-fed farmland.
Livestock	<ul style="list-style-type: none"> Herds of more than 10 goats. Poultry. 	<ul style="list-style-type: none"> Herds of 5 to 10 goats. Poultry. 	<ul style="list-style-type: none"> Less than 5 goats. Poultry. 	<ul style="list-style-type: none"> Poultry only.
Assets	<ul style="list-style-type: none"> Own motorised vehicle and bicycles. Own diesel water pumps. Have mobile phones. 	<ul style="list-style-type: none"> Own bicycles. No pumps. Some have mobile phones. 	<ul style="list-style-type: none"> Some own a bicycle, most don't. No pumps. Some have mobile phones. 	<ul style="list-style-type: none"> No transport. No pumps. No phones.
Food	<ul style="list-style-type: none"> Owns fishponds (for consumption and trade). Stored food can last for more than 3 months (maize, rice, and other products). 	<ul style="list-style-type: none"> Some own small fishponds. Stored food can last between 1 to 3 months (mostly maize). 	<ul style="list-style-type: none"> No fishponds. Stored food can last 1 month at most (only maize). 	<ul style="list-style-type: none"> No fishponds. No stored food.
Labour hire	<ul style="list-style-type: none"> Hire labour (5 to 10) for farm and non-farm activities. 	<ul style="list-style-type: none"> Hire some labour (less than 5) mainly for farm activities according to season. 	<ul style="list-style-type: none"> Occasionally hire labour for farm activities but mainly use family labour. 	<ul style="list-style-type: none"> Family labour.
Education	<ul style="list-style-type: none"> Most members have some secondary education and children go to school in town. 	<ul style="list-style-type: none"> Members have basic education and children go to local school 	<ul style="list-style-type: none"> Members have some primary education (many illiterate among the elderly). Children go to local school, but miss classes due to work. 	<ul style="list-style-type: none"> Members have little education (many illiterate among the elderly). Children go to local school if their work allows it.
Health	<ul style="list-style-type: none"> Go to hospitals when ill. Mainly public hospitals but can also pay for private care. 	<ul style="list-style-type: none"> Go to public hospitals. 	<ul style="list-style-type: none"> Go to public hospitals only if illness is severe (cannot afford medicines). Local healers are consulted first. 	<ul style="list-style-type: none"> Only access local healers.
Social aspects	<ul style="list-style-type: none"> Members of the chief's family. Most local authorities come from this group. Travel frequently to town and cities. Affiliated to political parties. 	<ul style="list-style-type: none"> Some local authorities come from this group. Are socially active (visit friends and organise parties) mainly in the village but also travel sometimes. Some are active politically but are not leaders. 	<ul style="list-style-type: none"> No authority positions. Some are socially active but have no money to organise big celebrations. Mainly visit friends. No political involvement. 	<ul style="list-style-type: none"> No authority positions. Little social activity. Mainly visit friends or neighbours from the village. No political involvement.
Income-generation activities	<ul style="list-style-type: none"> Cash-crops. Rent out land. Local shops. Agricultural / livestock traders. Lend money. 	<ul style="list-style-type: none"> Cash-crops. Rent out land. Local shops (small). Lend money (some). 	<ul style="list-style-type: none"> Some crops are sold, most are for self-consumption. Rent out land (occasionally). Wage labour. Seasonal migration to towns and cities. Some collect and sell forest products (e.g., firewood). 	<ul style="list-style-type: none"> Crops are for self-consumption. Wage labour. Seasonal migration to towns and cities. Collect and sell forest products (e.g., firewood).
Proportion of HHs that belong to category	10%	20%	40%	30%

Example. Detailed Socioeconomic classification

Changes in general well-being and livelihoods

- e) Have there been any major changes in the way residents make a living in the past '20 years' (change time interval according to what is more meaningful to local people)? Why?
- f) Do participants think that residents' well-being has improved or worsened during this time? Why?
- g) Has inequality increased or decreased in the last '20 years' (use your local knowledge to set an appropriate period)? How has that affected residents' relations (in economic and social terms)?

ES contributions to well-being and livelihoods

- h) Which of the benefits / products that people obtain from nature (e.g., irrigation water, wild-foods, etc.) do they consider the most important for making a living and satisfying their daily needs?
- i) Which social organisations or government programmes have the greatest impact over the way people use natural resources for making a living (e.g., water users' associations or forest management organisations)? Why?

Natural resource management

- j) How is access to key natural resources (e.g., rivers, lakes, forest areas, etc.) managed in the area?
- k) Are there any struggles between individual residents or groups over access to these benefits?
How do residents solve these conflicts? Are there any community organisations or authorities in charge of dealing with conflicts? Can they manage?

Disservices

- l) What kind of negative effects originating from nature (e.g., pests, malaria-carrying mosquitoes, floods, etc.) most affect local livelihoods and general well-being? Why?
- m) How do residents minimise the negative effects that result from local natural resources (e.g., risk of floods, pests, diseases, etc.)? Does the community have certain forms of organisation or rules that help managing or controlling these negative effects from nature?

11. Review your notes with the participants and ask them if they have any questions or comments.

12. Copy the table and take pictures of it.

4.5. Exercise E: Well-being Ranking

Why?

- To establish (non)economic indicators that characterise local socioeconomic groups.
- To estimate the socioeconomic composition of study areas.
- To provide a sampling framework for future PRA exercises and household surveys.

Who with?

- There are two main approaches to well-being ranking:
 - a) Work with a small group of informants (10 at most) that constitute a cross-sectional representation of the community (i.e., different economic and social groups). With this approach, you classify households based on group consensus. You can follow the same instructions as presented in **Exercise D** to select informants.
 - b) Work with different small groups of informants or, on occasions, individual informants interviewed one after the other (i.e., separate rounds of rankings). This approach requires calculating overall averages afterwards. These groups or key informants should come from a cross-section of the community.

The main advantages of approach 'a' are: (i) informed group consensus requires an agreement on classification criteria whilst in the approach 'b' the criteria used may vary from informant to informant, leading to inconsistencies; (ii) larger groups are likely to guarantee greater representativeness and (iii) it is faster.

Approach 'b' is recommended if, for logistical reasons, it is difficult to gather a representative group of informants, or if there are likely to be sensitivities in discussing the well-being of individual households in a group setting (discuss this with key informants prior to this exercise).

- ☞ Well-being rankings are limited to small communities where households know each other well. If the community has more than 100 households, consider working with a smaller (geographically or ethnically distinct) section of the community. Alternatively, you can run parallel discussions with groups or key informants from different areas of the community.

What with?

- Obtain an up-to-date list of all households in the village. This could have been obtained previously through secondary sources (**Exercise A**). If not available, you can develop one with local authorities. Another alternative is to rely on the information obtained from the social map of the community (**Exercise G**).
- Cards containing the name of the head of each household.
- A spacious area / room that guarantees privacy.
- A camera to register the material produced.
- A digital recorder to record people's interventions.
- A notebook to take notes.
- ☞ Use the same definition of 'household' established in the well-being and livelihoods discussion to ensure consistency.

How?

1. Explain the purpose of the exercise to participants. In general, you want to learn about:
 - ☒ What is the socioeconomic composition of the community?
 - ☒ What is the socioeconomic profile of each household? (Stress that this information will be kept confidential and will be used ONLY for future research activities).
 - ☒ What aspects differentiate the local socioeconomic groups from each other?
2. Start by reviewing with participants the definition of 'well-being' generated in **Exercise ①** and the main material and non-material indicators used to differentiate between the three / four socioeconomic groups established.
3. Take the pile of cards with the households' names. Make sure the cards are shuffled and, taking one card at a time, give it to the participants. Alternatively, if some of them are illiterate, you can read the names on the cards one at the time.
4. Ask the participants to think about their well-being and assign them to one of the three or four groups identified in **Exercise ①**.
5. For each card, after being assigned to a group, ask the participants about the following information: (i) is it a male or female headed household? (ii) does the head of household have a partner or is s/he single, divorced / separated, or widowed?, (iii) what is the age of the head of household? (an approximation is sufficient).
6. Continue the process until all the cards have been grouped into the three / four well-being groups.
7. When the piles are completed, ask informants which were the MOST salient characteristics that allowed them to classify all households into the different groups. Remember not to discuss the ranks of individual families but stick to the differences between groups.
8. After finishing the well-being-ranking, use the opportunity to discuss the following topics with the participants:

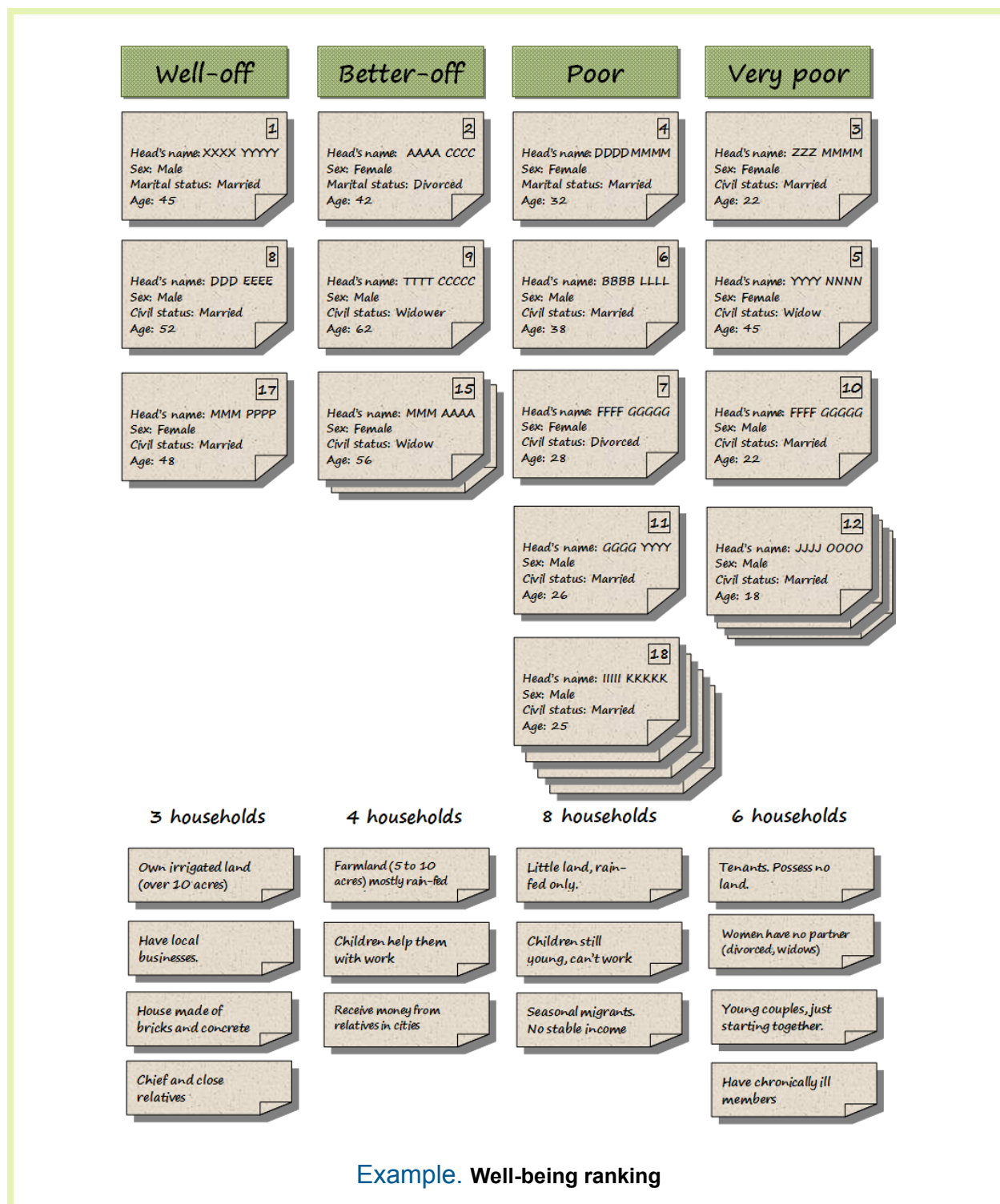
ES contributions to livelihoods and well-being:

- a) Are there any socioeconomic groups that heavily depend on products from nature (e.g., collection and trading of firewood, crabs, or fish) for making a living?

Changes in well-being and livelihoods:

- b) Have there have been any major changes in the socioeconomic composition of the village in the last '20 years' (use your local knowledge to set the most suitable recall period)? What were the main reasons?
- c) Are any of these changes related to any significant changes in the condition of local natural resources (e.g., deforestation, drops in soil fertility, increased frequency of erratic rains, etc.)?
- d) Have there been any policy measures (e.g., land expropriation, restrictions on commercialisation of bush meat or access to forests), governmental or NGO interventions that have significantly affected the socioeconomic conditions of local residents?
- e) At present, is it common that households change their socioeconomic condition from one year to another?

- f) What is more likely, that households move up into a better-off group or that they become poorer? What are the main reasons for these changes?



9. Review your notes with participants and ask them if they have any question or comment to add.
10. Take pictures of the lists generated. Make sure you capture all the information on each card.
 - ☞ Well-being-ranking exercises can be sensitive affairs. Make sure that the discussion does not focus on the ranks of individual families. This may cause bad feelings within the community. Emphasise that the data collected will be kept confidential.
 - ☞ Make sure participants understand that the information generated is not linked with any specific distribution of material benefits. Some informants may believe that being placed in the 'well-off' group could mean they will not have the right to access some form of assistance, thereby providing inaccurate data.

4.6. Exercise F: Household System Diagram

Why?

- To identify and describe local livelihood strategies and assess their effectiveness.
- To describe current land uses for livelihood purposes.
- To outline local farming systems.
- To identify the most important (in)direct contributions of ES to local livelihoods and food security.
- To identify the most important ecosystem disservices to local livelihoods and food security.
- To identify any seasonal / monthly variations in livelihood strategies / economic practices.
- To describe significant inter-annual changes in livelihood strategies and perceived causes.
- To outline current rights of access to and ownership of local natural resources and struggles over access to / use of ES.

Who with?

- We recommend conducting this exercise with informants from different socioeconomic profiles: a group of better- and well- off residents and a group of poor and very poor residents (use list of households generated in **Exercise 3**). Each of the groups should incorporate men and women and members of any other relevant social group (e.g., ethnic minorities) as well as those living in different areas of the community.
- If in the area of study there is a group of residents with a very distinctive livelihood strategy (e.g., fishermen), you may need to organise a separate group with them.

What with?

- A spacious area / room.
- A flipchart, a board or the ground.
- Writing / drawing material of many colours.
- A camera to register the material produced.
- A digital recorder to record people's interventions.
- A notebook to take notes.

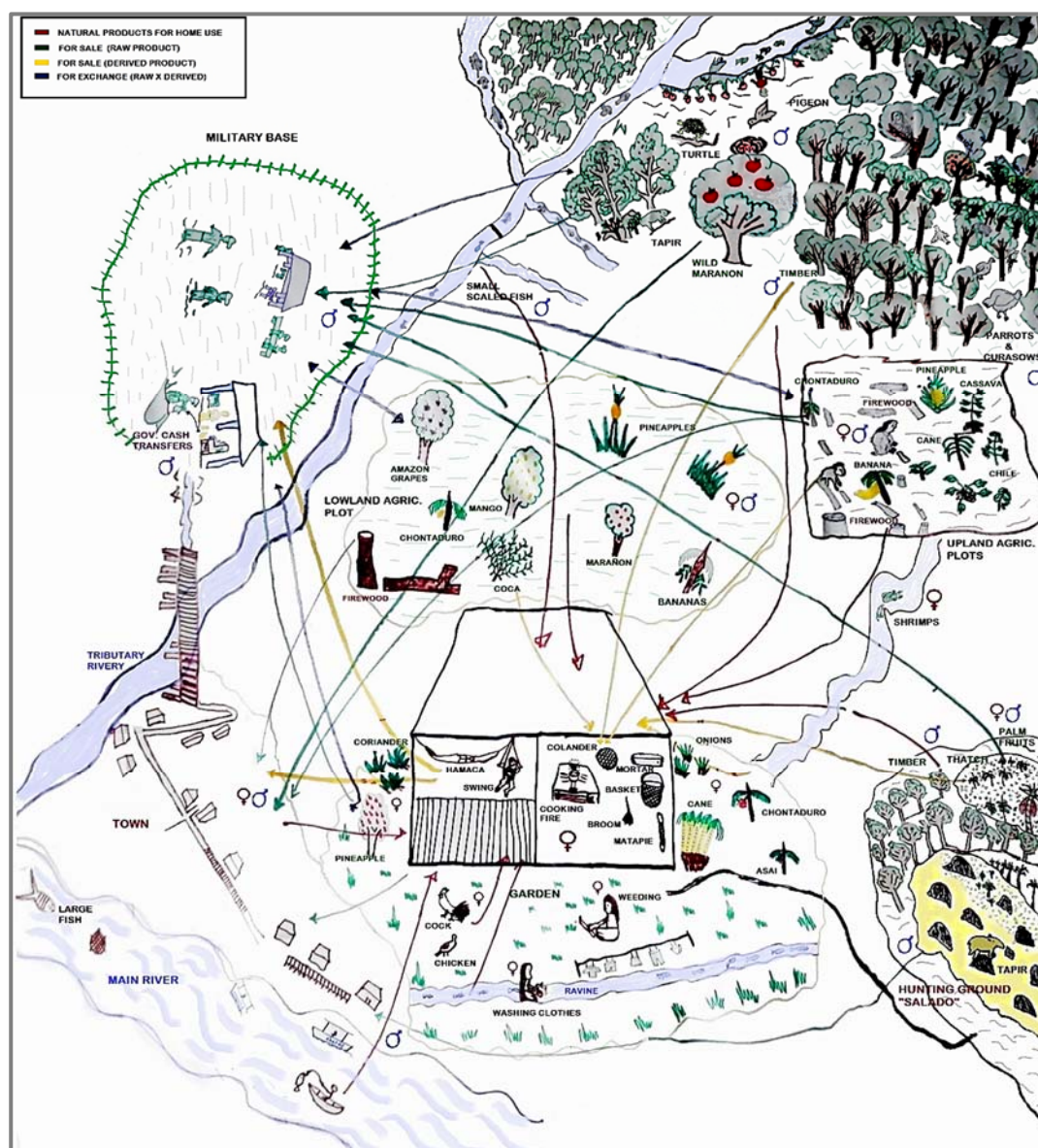
How?

1. Explain the purpose of the exercise. In general, you want to learn about the following topics:
 - ☒ How do people use local natural resources from farm and non-farm areas to make a living?
 - ☒ What kind of inputs are the most important for making a living and obtaining food?
 - ☒ How do people use their farm produce and the resources they collect/harvest/catch from non-farm areas (e.g., rivers, forests, etc.)?
2. Ask participants to draw a farm that represents the kind of house in which they live. The drawing should be placed in the centre of the board / flipchart / ground.

Make sure the drawing includes all typical elements of a farm: living space, kitchen, farm structures (e.g., barn, cowshed), common types of farmland (irrigated farmland, rain-fed

farmland, wetland, etc.) and livestock (e.g., poultry, goats, etc.) and any patches of forest or ponds they own, among other key features.

3. Ask participants to represent the various **INPUTS** they use on their farms: to cultivate their land (e.g., fertilizers, seeds, etc.), to manage their patches of forest or fish ponds (e.g., saws, nets), preserve or improve their houses and so on for each farm component. Try to achieve a consensus among participants of what inputs are commonly used.
4. Ask participants to identify the sources of these inputs (e.g., bought in market, obtained from the forest, lake, etc.). If more than one source of a similar nature is used (e.g., residents may have access to two different lakes or rivers), ask them to specify the name of the resource in question.
5. Connect inputs and sources with farm items with arrows (e.g., market in town X -> fertilizers -> irrigated farmland).
6. Going back to the initial list of farm components, ask participants about **OUTPUTS** generated from them: the main crops cultivated, fruits or timber obtained from forest areas, meat and livestock by-products as well as any other derived products (e.g., handicrafts). Proceed again to review the inputs and input sources used for these purposes.
7. In addition to the farm components, review each of the natural input sources identified previously (e.g., rivers, forest areas, etc.) and ask specifically for any products that residents obtain and/or derive either for sale or household consumption (e.g., timber for boats).
8. Connect outputs and destinations with farm items or non-farm areas with arrows (e.g., irrigated farmland -> maize -> market; forest reserve -> fruits -> sales by roadside).
9. Ask participants to specify the labour used to perform each of the different farm-based activities listed (e.g., household members, hired labour, visiting relatives). You can expand the analysis by differentiating if it is men, women or children who are responsible for bringing in inputs, producing derived products, and taking them to the market.
10. Give the participants some minutes to review the completed diagram and make corrections.
11. After the drawing has been completed, ask participants to identify all the inputs obtained from market sources and all the outputs / produced that are destined for the market. Make a list and ask about the current average prices of these items. Make the following distinction:
 - For **INPUTS**, ask about the consumer price (i.e., the price consumers pay for a given item in the market).
 - For **OUTPUTS**, ask about the producer price (i.e., the payment that producers receive when selling their crops or livestock).
12. Looking at the diagram, ask participants to identify all the inputs that have more than one source (e.g., farmland and forests) as well as those outputs that have more than one destination (e.g., for self-consumption and sale). Make a list of these items and enquire about the proportion of the typical distribution according to source or destination (e.g., % of crops used for sale or consumption).



Example. System diagram

13. Discuss the drawing with participants:

Local well-being and livelihood assessments

- Do participants consider these activities allow them to obtain an adequate and stable income? Why?
- Do they consider that these activities enable them to acquire enough food to feed their families? Why?
- How does this system of activities change during the year (according to season)?
- Is this system of practices different in other areas of the community (e.g., closer to the road, river or forest)? Why?

Changes in well-being and livelihoods

- e) Has this system of activities changed in the past '2 decades' (use the most relevant time interval according to your knowledge of the local area)? Why?

ES contributions to well-being and livelihoods

- f) Looking at the drawing, ask participants to identify the different non-farm areas (e.g., forest, river, ravines, wetlands, etc.) that contribute to their local livelihoods and well-being. Ask them which ones they consider the most important and why.
- g) Looking at the drawing, ask participants to identify the different ES benefits (e.g., wild-fruits, firewood, fish, etc.) that contribute to their local livelihoods and well-being. Ask them which ones they consider the most important and why?
- h) Do participants use any of these natural resources for non-economic purposes such as religious festivities, medicines, or for recreation? Which ones in particular?

Natural Resource Management

- i) How is access to key natural resources (e.g., rivers, lakes, forest areas, etc.) managed in the area?
- j) Is there a single set of rules or do they change according to the intended use (i.e., economic use as compared with traditional celebrations or collection of natural medicines)?
- k) Are there any bottlenecks with regards to accessing and using key ES benefits (e.g., limited access to forest to collect firewood) and/or any associated conflicts?
- l) How do residents solve these conflicts? Are there any organisations or authorities in charge of dealing with them? Do participants feel they are able to adequately manage these struggles?

Disservices

- m) Are there any environmental hazards or negative events coming from local natural resources that affect people's livelihoods and access to food (e.g., pests, diseases, floods, etc.)? Which ones do they consider the most damaging?
- n) Does the community have any system (organisations or rules) that try to control or prevent them?

14. Ask the participants if they have any questions or additional comments.

15. Take pictures of the diagrams and lists generated.

4.7. Exercise G: Participatory Land Use Mapping

Why?

- To identify and map current land uses for livelihood purposes.
- To identify and map areas in the landscape that provide (in)direct flows of ES and main sources of (in)direct ES benefits that contribute to local livelihoods and food security.
- To identify land tenure and forms of ownership of ES benefits.
- To identify changes over time in land use and perceived effects over ES provision.

Who with?

- We recommend that this exercise is conducted separately with men and women as they usually have different domestic roles and routines.
- Make sure that each group contains a cross-section of the community. The groups should include residents of different ages, socioeconomic condition and geographical areas.

What with?

- A spacious area / room.
- A large writing space, preferably on the ground.
- Writing / drawing materials of different colours.
- If preferred, local materials can be used as markers (e.g., seeds, leaves, flowers, etc.).
- A camera to take visual records of maps.
- A digital recorder to record people's interventions.
- A notebook to take notes.
- ☞ Allow participants to choose their own markers. Be aware that taking seeds or fruits to a community during the dry season, for instance, could be inappropriate due to food shortages.

How?

1. Explain the purpose of the exercise to participants. In general, you want to learn about the following:
 - ☒ How are houses and public services distributed in the village?
 - ☒ How do people use the land available in the area?
 - ☒ What natural resources (e.g., rivers or streams, patches of forest, etc.) are located in the area?
 2. Discuss different categories of land use with participants. Ask about particular types of local land use (e.g. home garden, food crops, fallow land, cash crop plantation, taboo or sacred patches of forest, wetlands, diverse types of farmland, etc.).
 3. Ask the group how they define 'forest' (e.g., density of vegetation, types of trees, or continuity of tree vegetation over time) and identify the forests of various types present in the area (e.g., evergreen, swamp forest, etc.)
- [N.B. the list can be pre-defined with key informants (**Exercise B**)].

4. Ask people to choose one person to draw the map (try to avoid everyone trampling over the map), and hand over the stick. However, make sure that everybody participates so as to avoid bias.
5. Help people get started with clear instructions (e.g., by suggesting they start with a river – to help them focus on the natural resources, or otherwise a road), but let them draw the map themselves.
6. Do not worry about the scale or exact orientation – the map is more important as a tool for discussion than as an exact image of reality.
7. Ask the participants to agree on symbols to indicate different land uses, etc. Make sure to write down the meanings attributed to each symbol (i.e., the legend).
8. Include houses and key buildings.
9. Discuss the following topics using the maps as reference:

Village characteristics

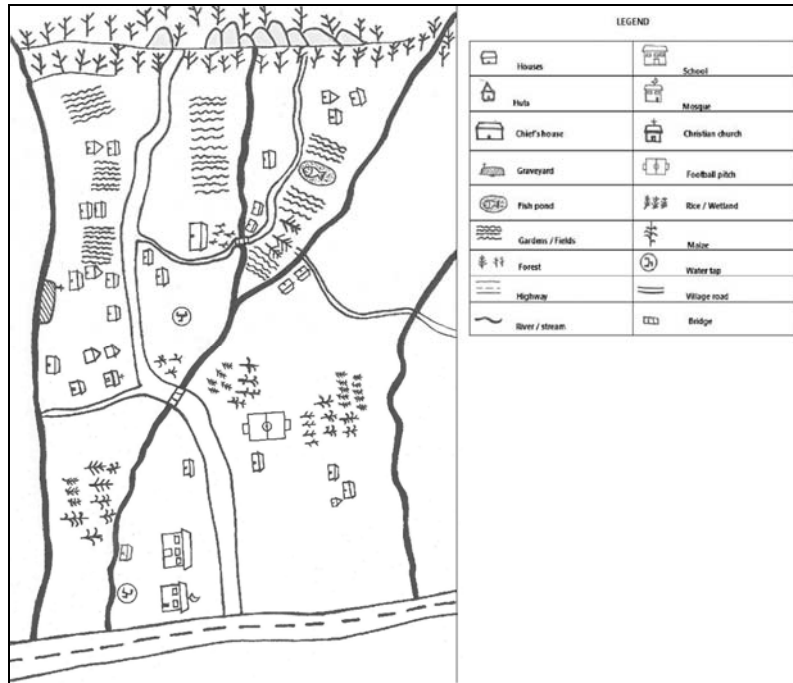
- a) Who are the nearest neighbours (villages)? Where are they located in reference to the map?
- b) Are the village boundaries well delineated and recognised or is there any ongoing land dispute with neighbours?
- c) Where is the main market? What kind of transport is available? How long does it take to get there?
- d) What infrastructure exists in the village (church, school, wells)? Who built them? Who maintains them?
- e) In terms of locations of houses, is there a particular area where the poor are more likely to live than the better-off? Why?
- f) Are there any other significant differences between residents living in different areas of the community (e.g., different religious orientations or ethnic background, etc.)?

Local land use

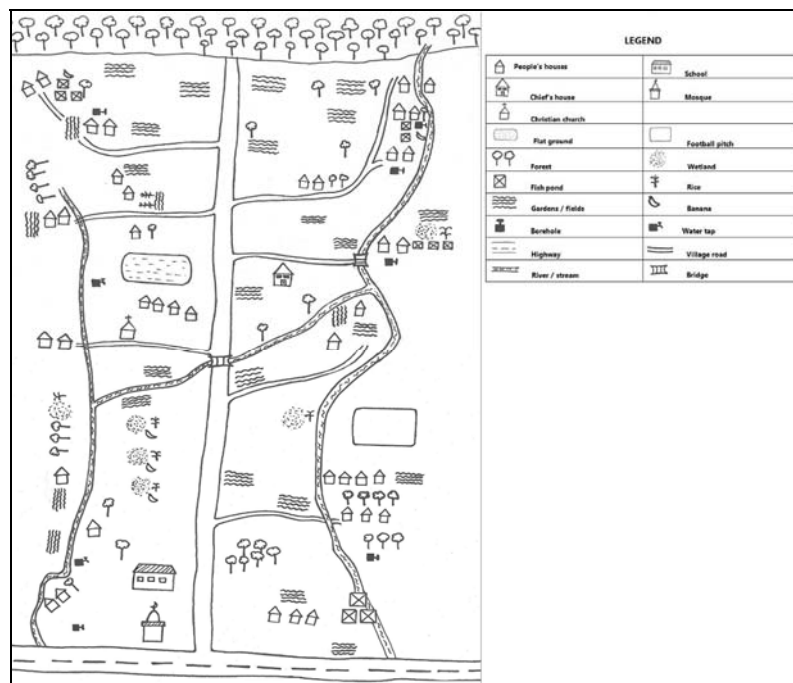
- g) Where are residents' farmlands? What type of farmland do participants possess (e.g., irrigated, rain-fed, wetland, etc.)? What types of crops do they commonly grow?
- h) How do they grow them (in what combination of crops)? What kind of land rotation system do they have for agriculture?
- i) How are land disputes managed? Is there any community organisation or local authority in charge of dealing with these disputes? Have they been successful? Why (or why not)?
- j) Where are the forests found in the community? What types of forests are these (e.g., evergreen, swamp forest, etc.) and what is their tenure status (ownership and management)?
- k) What types of forest products do community members collect, harvest or hunt?

Natural resource management

- l) What are the local land tenure arrangements? Is land tenure different for men and women? Do men and women have their own/separate land?
- m) What happens in cases of separation / divorce, additional marriages (i.e., polygamy) or death of a partner?
- n) Which forests do community members access forest products from? Have these forest products always been available here or has their distribution changed?



Example. Participatory Map – Men



Example. Participatory Map - Women

- o) Are there any conflicts over forest / river use (e.g. illegal activities, encroachment by non-community members, etc.)?
 - p) How do residents solve these conflicts? Are there any community organisations or authorities in charge of dealing with them? Are they able to manage those struggles?
- 10.** Review your notes with participants. Ask them if they have any questions or comments to add.
- 11.** Copy the map and take pictures of it.

4.8. Exercise H: Land Use Discussion

Why?

- To identify current land uses for livelihood purposes.
- To outline local farming systems.
- To identify the most important (in)direct contributions of ES towards local livelihoods and food security.
- To describe current conditions and trends in land use within the study area.
- To identify perceived effects of changes in land use on the provision of ES essential to local livelihoods and food security.
- To identify direct and indirect drivers of changes in ES and ES benefits.
- To describe existing rights of access to and ownership of local natural resources and mechanisms of negotiation and enforcement.

Who with?

- This type of exercise can be conducted using two different approaches:
 - a) A relatively large group with a cross-section of the community (i.e., men and women, better and worse off residents, inhabitants from different sections of the village, etc.). This approach has the advantage of providing results in a short time.
 - b) A more in-depth discussion can be obtained by working with a few small groups of informants with different forms of land use for livelihood strategies (e.g., owners of larger land areas, small farmers or herders / ranchers).

What with?

- A large space or a spacious room.
- Maps produced in **Exercise G**.
- Transparency sheets and suitable markers to draw over maps.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise. In general, you want to learn about the following:
 - ☒ How do people use the land available to generate an income and to obtain food?
 - ☒ What have been the main changes in land use over the past decades?
 - ☒ What forms of land tenure operate in the area and what restrictions do people have in order to access and benefit from communal areas (e.g., forests or rivers)?
2. You may flexibly use the following topic list to lead the discussion. Remember to use the participatory maps to facilitate the discussion.

Local land use

- a) Start by reviewing the participatory map (**Exercise G**). Ask participants if they agree with the main land use areas identified and if there is some information missing.

- b) How do these different land uses contribute to local livelihoods? Aside from agriculture, what other income-generating activities are derived from them?
- c) How do these different land uses contribute to families' access to adequate food?

Farm systems

- d) What are the main crops grown in the area? How are they distributed in different areas of the village (e.g., grown in hills or plains)?
- e) What kind of inputs do farmers commonly use (e.g., pesticides, fertilisers, seeds, etc.)? Which ones are self-produced? Do they use any products from their farm or communal areas?
- f) What land rotation strategies are most commonly used? Are these also applied to communal farmlands (if any)?
- g) What other measures do residents take to preserve the fertility and general good condition of their land (e.g., to prevent soil erosion)? Are these also applied to any communal farmland (if any)?
- h) What are the main constraints faced in local agriculture? Prompt about the following limitations:
 - ☒ Technical (e.g., lack of machinery),
 - ☒ Labour (e.g., only children help in farm),
 - ☒ Financial (e.g., no access to credit),
 - ☒ Deterioration of natural resources (e.g., soil fertility, soil erosion, decreasing land and water availability).
- i) How do people deal with each of these constraints?
- j) What measures do residents take to look after the condition of other private landscape areas key to their livelihoods (e.g., ponds and patches of forest)? Are these equally applied to non-farm communal areas (e.g., lakes, mountain forest, etc.)?

Changes in land use

- k) What changes have been observed in the last '2 decades' (use the same recall period established in previous exercises) with regards to land use, crops cultivated and problems faced in agriculture?
- l) How have these changes affected the condition and functioning of local natural resources (e.g., salinisation of ground water, contamination of water sources, etc.)?
- m) What caused these changes? Were these factors local (e.g., change in crop preferences) or external (e.g., infrastructure projects)?

Natural resource management

- n) What are the local land tenure arrangements? Is land tenure different for men and women? What happens in case of divorce or death of a partner?
- o) How is land allocated in the area (e.g., when a new resident migrates to town)? Is there any land presently unassigned? If so, who uses it?
- p) How do trees fit into this system? Who can plant/harvest/cut/sell trees?
- q) Ask broadly about harvesting forest products (e.g., firewood, wild-fruits): Who can do it? Who actually does it? How are these resources used (e.g., own-consumption, sales, exchange, etc.)?
- r) What tenure and admission rights regulate people's access to communal areas (e.g., lake, forest, communal farmland, etc.)? Are they different for men and women?

- t) Have tenure and access rights to land and communal resources changed in the past '2 decades' (use the same recall period established in previous exercises)? How?
 - u) Is there enough land for all at present? How do residents deal with issues of land scarcity?
3. Take a few minutes to review your notes with the participants. Ask them if they have any questions or comments.

4.9. Exercise I: Participatory GIS

Why?

- To identify and draw geographically detailed maps of current land uses for livelihood purposes within the case study communities.
- To identify and draw geographically detailed maps of landscape areas that provide (in)direct flows of ES and main sources of (in)direct ES benefits that contribute to local livelihoods and food security.
- To identify land tenure and forms of ownership of ES benefits.
- To identify changes over time in land use and perceived effects on ES provision.

Who with?

- This exercise can be done with a group that constitutes a representative cross-section of the community. It should incorporate men and women, residents from different geographical areas of the village, and members of different relevant social groups.

What with?

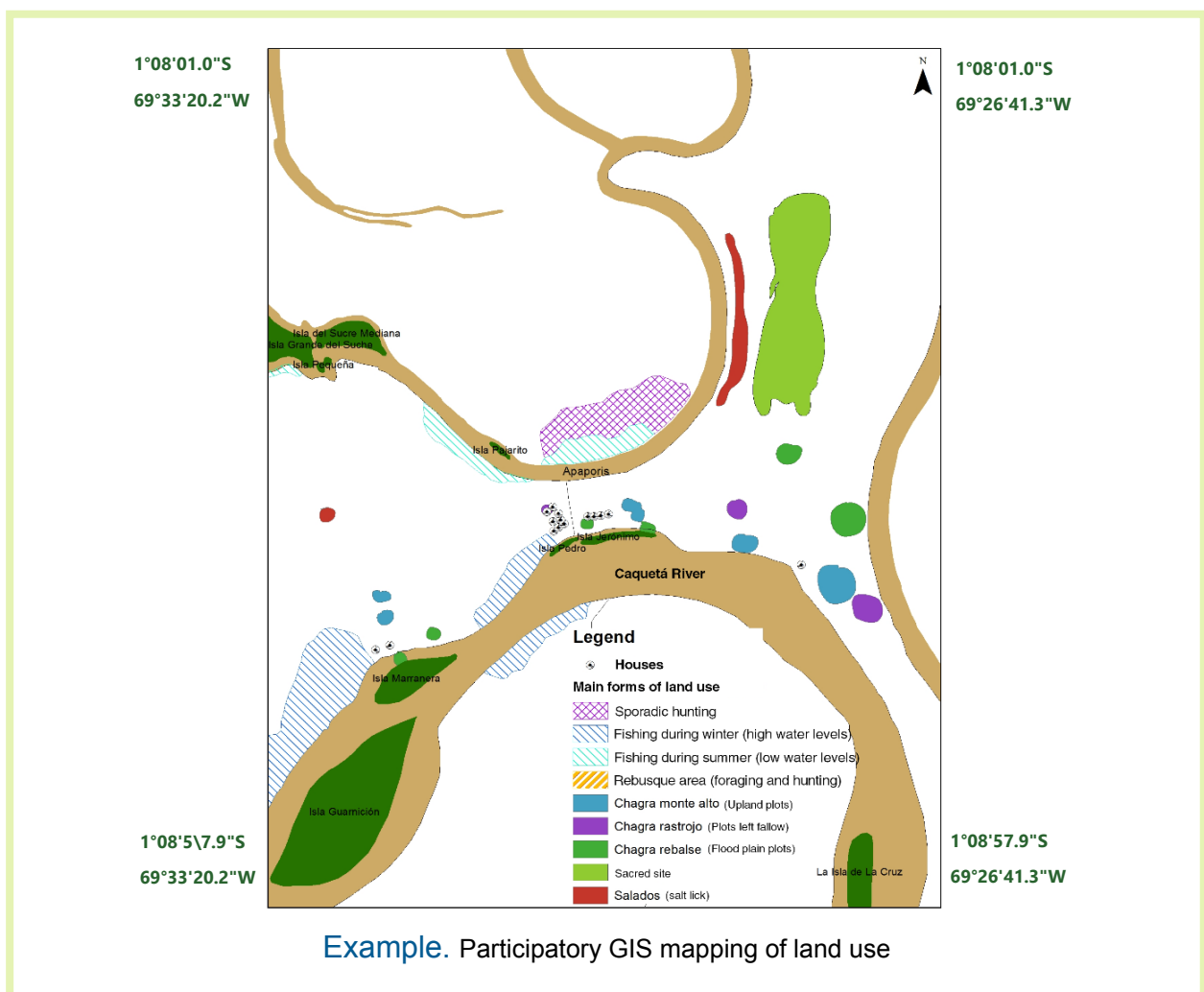
- A copy of the participatory land use maps (**Exercise G**), both men's and women's.
- An aerial photo (or google earth image) of the village.
- Transparency sheets and suitable markers to draw and mark areas over maps.
- A camera to take visual records of landmarks (with a GPS location system).
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise to participants. In general, you will enquire about:
 - ☒ Where are the boundaries of the village located?
 - ☒ What are the dominant forms of land use in the area?
 - ☒ What are the key landmarks in the village?
2. Review the key findings from the Participatory Mapping (Exercise G) with participants. Make sure that all are familiar with the key landmarks and forms of land use depicted in the maps.
3. Compare the information contained in both men's and women's maps. Check the commonalities and differences with informants and consolidate the results from the two maps with regards to the following key features on the aerial view of the village:
 - ☒ The boundaries of the village.
 - ☒ Main forms of land use (e.g., irrigated farmland, wetland, etc.).
 - ☒ Main natural landmarks (e.g., river trajectory, streams, etc.).
 - ☒ Distribution of dwellings.
 - ☒ Important man-made structures (e.g., school, churches, access roads, boreholes, etc.)
4. Proceed to locate the consolidated land-use areas and landmarks on the aerial view of the village making use of transparencies. Use different transparencies and colours according to

the subject in question (e.g., one layer for access roads drawn in red, another for dwellings drawn in black, a different one for forest areas drawn in green, etc.).

5. Review the main features of the new version of the village map and identify key features to visit with local residents. Trace a path that would let you walk across the community visiting the geographical areas depicted on the transparencies.
6. Accompanied by some key informants, visit each of these areas with GPS equipment. During the walk, take pictures of key landmarks with GPS enabled cameras and note the coordinates of each landmark.
7. Throughout the process, verify the information from participatory maps with participants and update any new pieces of information that arise during the walk.
8. Review your notes with participants. Ask if they have any questions or additional comments.



4.10. Exercise J: Transect Walks

Why?

- To identify current land uses for livelihood purposes.
- To identify areas in the landscape that provide (in)direct flows of ES and main sources of (in)direct ES benefits that contribute to local livelihoods and food security.
- To describe land tenure and forms of ownership of ES benefits.
- To describe changes over time in land use and perceived effects on ES provision.

In addition, this exercise also serves to familiarise researchers with the layout of the community, and to talk with smaller groups of end-users about stocks of natural resources, forms of land use, tenure and boundary issues, as well as implementation of rights to access and exploit natural resources.

Who with?

One or more transect walks can be carried out with different groups of informants. The latter should be selected according to their knowledge of the areas to be visited. For instance:

- It may be appropriate to visit water source areas with members of a water management committee or forests with forest management committee members (if these exist).
 - Forest could also be visited with people that are particularly reliant on forest products (hunters, fuel-wood sellers, etc.).
 - A specific walk could be made with women to explore their main collection areas and the constraints they face.
- ☞ Try to combine transect walks with the Participatory GIS mapping exercise (**Exercise 1**).

What with?

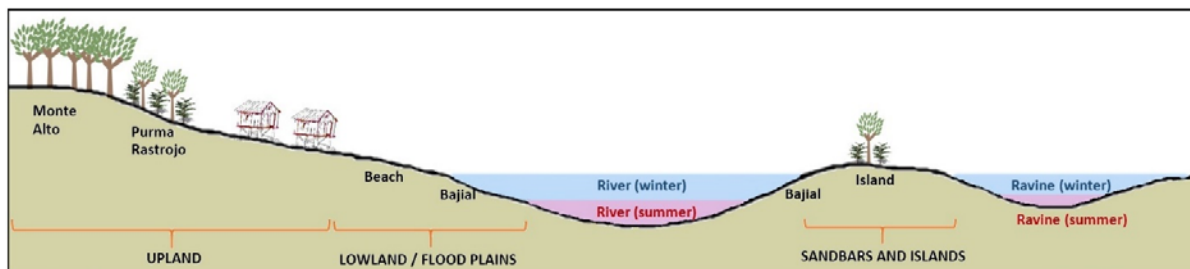
- A copy of the participatory map generated in **Exercise 6** or of the PGIS map from **Exercise 1**.
- A camera to take visual records (with GPS location system).
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise to participants. In general, you want to know about:
 - ☒ How is land used in different areas of the community?
 - ☒ What are the main natural resources, plants, and animals present in the area?
 - ☒ What kinds of benefits do people obtain from these natural resources either for income-generation or food security?
2. Review the participatory map or the PGIS map with the group of informants and decide which paths to follow. You can outline as many routes as necessary to attain a comprehensive picture of the community. However, it is rarely necessary to do more than three transects.

Use the following criteria:

- ☒ Visit the boundaries of the community. Pay attention to any areas that are not clearly defined (but avoid getting engaged in any land disputes).
- ☒ Visit all key communal areas.
- ☒ Visit each different type of farmland and other key private areas described in previous discussions (e.g., woodlots, fish ponds, etc.).
- ☒ Visit any sections of the community located at different levels of altitude.
- ☒ Visit areas separated from the village centre by key landmarks (e.g., rivers or swamps).



	MONTE ALTO, FIRME, BRAVO, VIRGEN.	RASTROJO	MONTE BAJO, BAJIAL	ISLAND	RIVER	RAVINE, STREAMS AND SEASONAL LAKES
TOPOGRAPHY	Upland areas covered by thick (primary) forest areas. Not affected by floods. Soil: peat lands and clay.	Upland plots left fallow and covered by secondary forest. Soil: clay and sandy.	Lowland areas, flooded during rainy season. Soil: clay and sandy. Silt is added during floods.	Appear during summer, mostly as sandbanks. Soil: sandy. Silt is left after floods.	Main river cutting across the study area. Water levels: 4m during summer, 9m in winter.	Water sources connected to rivers (over or underground). Width and depth vary according to seasons.
USES	- Hunting. - Agriculture. - Foraging (wild fruits, medicinal plants, etc.)	- Firewood collection - Foraging: fruits, medicinal plants, etc.). - Agriculture.	- Firewood collection - Foraging: fruits, medicinal plants, etc.). - Agriculture. - Fishing (rainy season).	- Hunting (rainy season). - Agriculture - Foraging: wild-fruits.	- Fishing. - Travelling (by canoes and motorised boats).	- Fishing - Domestic use: bathing, water source for cooking and washing.
WILDLIFE AND LIVESTOCK	Wide variety of animals: peccaries, agouties, monkeys, birds of many types, including parrots and curassows.	Wide variety of smaller species of animals: rodents and birds.	Small scaled fish species during rainy season. Aside from birds, no other major wildlife is observable.	Small animals are trapped when water levels increase (e.g., agouties). Birds of various types are present (e.g. parrots and curassows).	- Small scaled fish (self-consumption): <i>palometa</i> , <i>boquichico</i> , <i>sábalo</i> , <i>omima</i> , <i>majarra</i> , <i>gamitana</i> and <i>picalón</i> . - Cat-fish (commercial): <i>pintadillos</i> , <i>barbudo</i> , <i>bocón</i> y <i>baboso</i> - Large scaled fish (commercial): <i>pirarucu</i> .	- Small scaled fish (self-consumption): <i>palometa</i> , <i>boquichico</i> , <i>sábalo</i> , <i>omima</i> , <i>majarra</i> , <i>gamitana</i> and <i>picalón</i> - Turtles, turtle eggs, caiman and caiman eggs are also found.
CROPS, PLANTS AND TREES	- CROPS: tubers (cassava, ñame), bushes (coca and tobacco) and fruit-plants (bananas and pineapple). - Palm trees (e.g., <i>canangucho</i>) and fruit plants (e.g., <i>caimo</i> , <i>juancoso</i>). - Timber trees: <i>garuma</i> , <i>acapú</i> , <i>itauba</i> , <i>laurel</i> , <i>baboso</i> and <i>aguacatillo</i> . - Palm leaves (pui palm). - Medicinal plants (e.g., <i>colmillo de danta</i>).	- CROPS: tubers (cassava, ñame), bushes (coca and tobacco) and fruit-plants (bananas and pineapple). - Similar species of trees but young. Mostly used for firewood (e.g., <i>carguero</i>). - Palm, palm-fruits and other fruit trees: <i>chontaduro</i> , <i>uvo</i> , <i>copoazú</i> , <i>guama</i> , <i>umari</i> . - Medicinal plants (e.g., <i>colmillo de danta</i>).	- CROPS: cassava, bananas, plantains and sugar cane. - Young trees species are used for firewood (e.g., <i>acre</i>). - Timber trees: <i>mamita</i> , <i>carguero</i> and <i>sangre toro</i> . - Palm and palm fruits are also found in this area (e.g., <i>canangucho</i>)	- CROPS: annual crops: maize, sweet cassava and bananas. - Palm and palm fruits are also found in this area (e.g., <i>canangucho</i>)	Non Applicable	Non Applicable
OWNERSHIP	Communal. Use requires permission of authorities.	Communal. Use requires permission of authorities.	Communal. Use requires permission of authorities.	Communal. Free to use (first-come first-served).	Open access	Open access for community members

Example. Transect walk in riverine communities of the Amazon Basin

3. Ask the following questions along the way (when applicable):

- a) What are the main topographic features of the area (altitude, soil type, extension of vegetation, presence of water sources, etc.)?
- b) What is the main use of the area being visited?
- c) What main crops / plants / trees are prevalent in this area?
- d) What kinds of livestock / wildlife are prevalent in this area?

- e) Can residents recall any plants, trees or wildlife that used to be prevalent in the area but are no longer available?
 - f) What types of wild foods do people collect, hunt or harvest from this area?
 - g) What products are only found in this area?
 - h) Who owns these resources? If public access: are there any groups from the community particularly involved in collecting such products from this area (e.g., the poorest residents)?
 - i) Are there any harvest / hunting restrictions? How are they established and enforced?
 - j) Is there any competition or conflict over these resources? How are they managed or resolved?
4. In addition to these enquiries, use this opportunity to clarify any doubts from the participatory mapping exercise.
- ☞ Take pictures of the areas visited along the way to illustrate the main areas of enquiry pursued during the transect walk (topography, land use, crops, plants and wildlife). Use the GPS functionality to register the coordinates of sources of ES, land use areas and other key local landmarks.

4.11. Exercise K: Trend Analysis of Land Use

Why?

- To describe current conditions and trends in land use within the study area.
- To identify declines in ES benefits essential to food security.
- To identify perceived effects of changes in land use on the provision of ES essential to local livelihoods and food security.
- To outline plausible future scenarios of ES provision and land use.
- To outline potential future responses from communities and support required.

Who with?

- Small groups of people (typically no more than 10).
- Choose a few old people (both men and women) and a few respected younger members of the community. Try to incorporate older community leaders in the group.
- This exercise can be carried out with one group of community members or with separate groups of different well-being status or men / women. The latter is recommended when there are distinctive land use practices for different social groups (e.g., larger land-owners as compared with micro-farmers; herders as compared with hunters, etc.).



Be aware of local customs that prevent younger residents from speaking freely in front of elders. If this is the case, it may be necessary to conduct separate groups for younger residents.

What with?

- A spacious area / room.
- A flipchart, board or the ground.
- Writing / drawing materials of different colours.
- A camera to register all the material produced.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise to participants. In general, you will enquire about:
 - ☒ How do people use the land available to earn an income and to obtain food?
 - ☒ What have been the main changes in land use over the past decades and what is their vision of the future in this respect?
2. Start the discussion by asking people about the present condition of the main forms of land use in the area (e.g., types of farmland and productivity, access, or conflict issues emerging, etc.). Use the maps obtained from the participatory mapping exercises (**Exercise G** or **1**) to focus the conversation on the main forms of land use previously identified.
3. Facilitate the discussion to define a series of land-use aspects for which it would be worth analysing changes over time in order to understand current conditions. You may discuss the following topics:
 - ☒ Changes in land uses that are important for livelihoods and food security purposes.

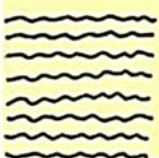





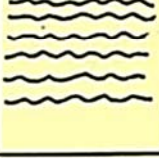





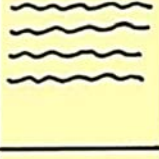
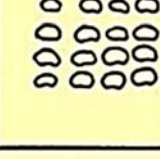
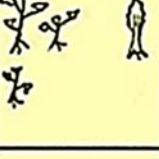
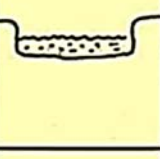
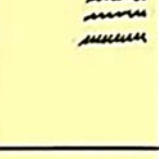

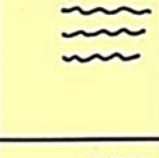
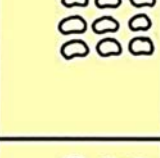

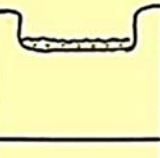
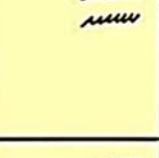







- ☒ Changes in main ES obtained from these types of land: crops cultivated, forest resources collected, etc.
 - ☒ Changes in availability or access to land use areas.
4. Facilitate the selection of time landmarks across which the trends can be studied. You can use time intervals (e.g., 10 years ago, 20 years ago, etc.) or identify certain years that had a significant effect on local land use regimes and practices (see the timeline in **Exercise 8**). These should be relevant to the topic in question and easy for people to relate to. Agree the method to be used with the participants.
 5. Ask participants to outline a matrix. Across the top list the different elements that the group has decided to analyse, and note the different time-periods established down the side.
 6. Take up one of the aspects to be analysed and ask participants to depict the situation today and then go backwards through each time-period.
 7. After discussing the past, ask participants what they think the state of this aspect will be in 10 years' time.
 8. Repeat this process for each aspect listed until the matrix is filled.
 9. Do not try to simply quantify changes (i.e., if things increased or decreased). Instead, encourage participants to use symbols and drawings to provide rich depictions of a particular period (e.g., changes in the types of crops, trees or wildlife predominant at a time).
 10. Give the participants time to review the matrix and make any amendments necessary.
 11. Discuss the diagram with participants. Some key questions for the discussion could include:

Changes in land use and ES

- a) Ask participants to describe the drawings over the time periods mentioned for each of the forms of land use discussed.
- b) What patterns or trends do participants perceive?
- c) What factors do they think caused these changes? Which ones emerged locally (from the community or other local areas) and which ones were due to external processes (natural, such as climate change, or man-made, such as new laws, new roads, bridges, or changes in market transactions)?
- d) Have changes affected the condition of other natural resources (e.g., variety of forest plants, presence of wildlife, quality of water from neighbouring rivers)?

ES contributions to livelihoods and well-being

- e) Have the observed trends and changes affected the sustainability of local livelihoods? How?
- f) Have these trends in land use affected residents' capacity to access food throughout the year? How?

Time	Fertile soil available	Land productivity	Forest	Rivers and ravines	Grassland	Crops
30 years ago						
20 years ago						
10 years ago						
Present						
10 years in the future						

Example. Trend analysis using symbols

Responses / Adaptations to trends

- g) Have people changed their livelihood strategies to deal with these trends? How?
- h) Have residents modified their strategies to obtain food or deal with food shortages? How?
- i) Have there been any external interventions (from NGOs or the government) or policy restrictions (e.g., certain forms of forest use are now illegal) to manage or reverse these trends? Were they successful? Why?
- j) Have there been any local initiatives (either from the community or other local organisations) aimed at managing or reversing these trends? Were they successful? Why?
- k) Do participants consider that the community could do more to control or reverse these trends? What and why?

Views of the future and potential responses

- l) Ask participants to explain their depictions of the future. What factors did they consider?
 - m) Of all the negative changes identified, do they believe that some of them are now irreversible? Why?
 - n) What kinds of external interventions (from NGOs or the government) do they believe would be necessary to reverse the negative trends identified?
- 12.** Thank the participants and ask them if they have any questions or comments to add.
- 13.** Copy the diagram onto a piece of paper and take pictures of it.

4.12. Exercise L: Seasonal Calendars

Why?

- To identify seasonal variations in livelihood strategies.
- To identify seasonal variations in access to food.
- To identify seasonal variations in income availability.
- To identify seasonal variations in (in)direct contributions of ES.
- To identify seasonal variations in health issues.

Who with?

- Work with a small group of informants (typically no more than 10).
- We recommended conducting this exercise with at least with two groups: men and women.
- It may also be useful to work with different socioeconomic groups or groups with very distinctive livelihood strategies (e.g., herders or fishers), as long as they constitute a significant part of the community).

What with?

- A large space or a spacious room.
- Writing / drawing materials of various colours.
- A flipchart, board or the ground.
- A camera to register all the material produced during the meeting.
- A digital recorder to record people's interventions.
- A notebook to take notes.

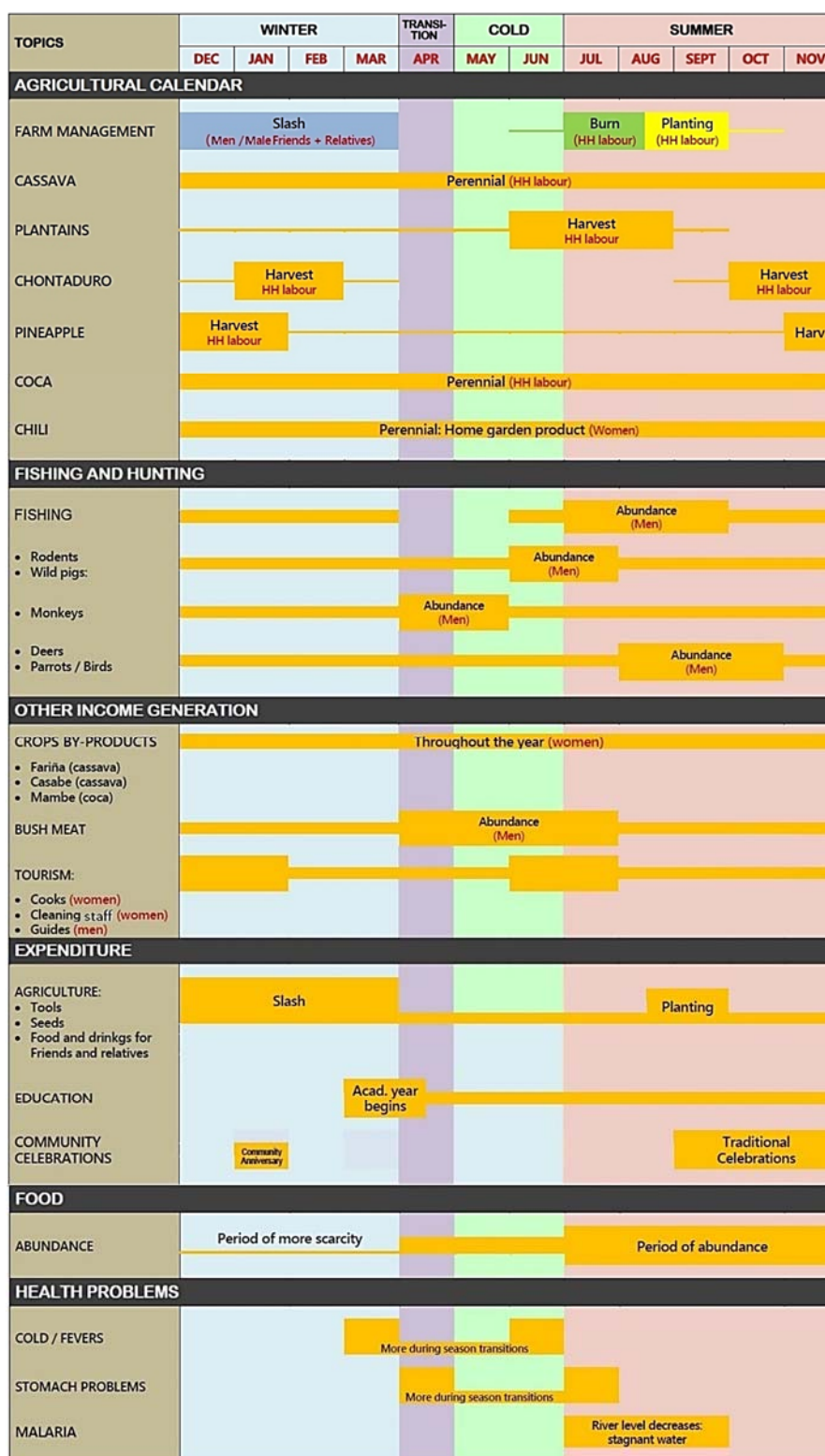
How?

1. Explain the purpose of the exercise. In general, you want to learn about the following:
 - ☒ How do residents perceive a 'year' and how do they divide it?
 - ☒ How do people's economic activities and access to food vary across the year?
 - ☒ What health problems occur regularly at certain times of the year?
2. Start by discussing the different seasons of the year that residents typically distinguish. Establish whether participants are happy talking about months or whether they prefer to talk about seasons or particular 'marker' activities (e.g., harvest season).
3. Once you have agreed on the local season, ask them to identify when they consider that the year 'begins' and why.
4. Draw a table with the seasons / months in the top row, starting with the 'beginning' of the year as specified by the participants.
5. Ask participants to list the main crops they cultivate. Include both cash crops and those grown for own consumption. Draw a separate row on the table for each crop. Use symbols to represent them (as agreed by the participants).
6. For each crop, ask participants to indicate during which part of the year they perform the different stages of agricultural production (e.g., harvest and planting activities).

7. Use lines or bars to indicate the time interval in which these (and subsequent) activities are performed. Make sure to use some indicators of intensity (e.g., draw a bigger/taller bar, a peak in the line trajectory, or a circle in the peak season to show when the activity is more intense).
 8. Next, ask participants to list the main income-generation activities they conduct (try to focus on the most important). Explain that we are interested in farm and non-farm income-generation activities as well as any subsistence activities that residents conduct on a regular basis (e.g., seasonal work as farm labourer, seasonal migration to cities to work and / or seasonal collection of wild-vegetables or fruits either for sale or own consumption).
 9. If hunting, fishing and other forest-related activities are not mentioned, ask the informants if they can be added to the list (but note that this is the group's decision, not yours). For forest products, make sure this includes timber and non-timber forest products (e.g., firewood, wildlife, etc.).
 10. For each of the income-generation activities listed, ask the participants to indicate the time of the year in which they are engaged in these activities. Remember to use indicators of intensity to signal when they dedicate most of their time to these activities.
 11. Ask participants to indicate the labour involved in each activity during the year for both farm and non-farm based income-generation activities. Ask who does which activity (men, women, children, hired labour). If, as part of seasonal work, HH members migrate to other areas, distinguish between migration to cities and to other rural towns or plantations.
 12. Ask participants about household expenditure in a year. What are the seasons / months in which they spend most of their money and resources? List briefly the main reasons.
 13. Draw a separate calendar (or add another row) and ask about food security. Ask participants to identify the periods when they have greater access to quality food and when they face severe food shortages (or have to resort to low-quality food to survive). Note the main reasons.
 14. Draw a separate calendar or add a line to the existing one and ask about local health issues. Ask participants what kinds of diseases are present in the area and during what periods of the year most people become ill with these. Identify which HH members are more likely to fall ill (children, adults, the elderly). Ask briefly about the main reasons.
- ☞ The proposed exercise will generate a long calendar with many rows. Repeat the headings marking the calendar's seasons after every few rows to keep the different sections of the graph aligned.
15. Analyse the calendars with the participants, using the following checklist:

Agricultural calendar

- a) Do all farmers cultivate the same crops? Why do some cultivate other crops?
- b) Are the main planting and harvesting seasons the same for all the villagers? Why?
- c) Ask about the balance between consumption and sale for local crops. How much is usually destined for the market? How do residents decide the amounts to be sold / consumed?



Example. Trend analysis using symbols

Income-generation activities

- d) Is the calendar of income-generation activities the same for all villagers? Are there any activities that are more important to some residents? Why?
- e) Ask about the contribution of these different activities to local households' income:
 - i. How much of total family income comes from the commercialisation of farm products (e.g., crops, livestock, etc.).
 - ii. How much of total family income comes from waged labour work (farm or non-farm)?
 - iii. How much of total family income comes from the commercialisation of forest products (timber and non-timber forest products)?
 - iv. How much of total family income comes from the commercialisation of other local natural resources (e.g., fishing, hunting)?
- f) Who keeps or decide what to do with the income generated from each of these activities?
- g) Do prices of crops and other natural resources that are sold fluctuate constantly? Why? Is it possible to negotiate a good price? How are prices settled?
- h) Do wages and salaries fluctuate? Why? Is it possible to negotiate obtaining a good payment? How are wages established?
- i) How do people manage at those times of the year when there is high expenditure but low income?
- j) Where do people usually migrate to find work? Do migrants come to the area at particular times of year? What is the main work they do over there / here?

Health and Food security calendar

- k) Are all residents equally affected by seasonal illnesses? Which people in the community appear to be most vulnerable? Why?
- l) How do people treat or try to prevent common illnesses during those seasons when there is a particular health concern (e.g., malaria)? Do residents rely on local medicinal plants?
- m) What factors do people think cause food shortages at particular times of the year?
- n) How do people manage at those times of the year when there are food shortages?

Changes in seasonality

- o) Has the seasonal distribution of crops, income-generation activities, and food security and health changed in the past 2 decades (use local knowledge to select reference period)? What aspects? Why?

16. Thank the participants. Copy the diagram and take pictures of it.

4.13. Exercise M: Food Discussion and Food Source Matrix

Why?

- To identify the main food products (staple and non-staple) consumed by the local population.
- To identify and assess ES direct contributions to food security.
- To identify seasonal variations in diets and access to food.
- To rank local food sources according to importance.
- To identify any spatial effects on ES direct contributions to food security.

Who with?

- This exercise is best conducted with a group of women (eight at most) who are responsible for cooking for their families.

What with?

- A spacious area / room.
- Flipcharts, a board or the ground.
- Coloured paper or cards.
- Writing / drawing material of different colours.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?



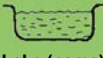




1. Explain the purposes of the exercise. In general, you want to learn about the following:
 - ☒ What types of food do people consume in the village?
 - ☒ From what sources do residents usually obtain their food?
2. Ask participants to list the food products they usually consume. Allow participants to recall ALL types of food freely, in no particular order. Ask participants to be specific, it is not enough to say 'fish' or 'birds', ask them to identify the particular type of fish or bird they consume.
3. Once the list is complete, read it to them and enquire if they want to make any additions.
4. Next, ask participants to identify the MAIN sources of food used for each of the products listed. Ask for detailed descriptions. If they mention 'the market', specify its location (neighbouring village, town, or city); if they mention their 'farm', clarify if it is obtained from their farmland, wetland, or their personal vegetable garden; if they mention 'the forest' or 'the village', identify if it is from their privately-owned or communal areas. Use the results from the land-use exercises (6 to 11) to identify different types of forests, farmlands and water sources.

Take note as well of any source of donations (e.g., NGOs, the church, relatives, etc.) or others (e.g., food remittances).
5. Once you have a complete list of food products and sources, ask participants to mark on the list which products are the most important components of their diet.

6. Once you have confirmed the list of key items, discuss the following topics:
 - Why do they think these products are so important in their diets? Ask participants to generate a list of criteria (e.g., easy to cultivate, available in the forest, inexpensive, etc.).
 - Ask participants to indicate which reasons mentioned they consider the most important and why?
 - Ask participants to describe how much their diets change across seasons. What products do they stop consuming between seasons and which ones do they usually consume throughout the year? Why?
7. After the discussion, proceed with a matrix scoring exercise on food sources. You can treat the following as a separate exercise if the participants are too tired. If you do, be sure to work with a comparable group of informants.

For this exercise, follow the instructions below:

- Use cards containing the names of ALL the different food sources identified by the participants at the beginning of this exercise, shuffle them and ask the participants to sort them according to their importance.
- Ask participants the reasons why they ranked the different food sources in a particular order.
- Produce a matrix. In the rows, list the criteria used by residents to assess the importance of a food source. Sort them in order of importance.
- In the columns, list the main food sources.
- Out of a potential maximum number of points (e.g., ten beans, seeds or stones), ask participants to agree upon a score that would indicate how well each food source performs in relation to each of the valuation criteria.
- Make sure that the criteria are phrased in a positive manner so that a greater score represents a better overall condition and importance.
- Give the participants some minutes to confirm the scores assigned.

CRITERIA	Farmland 	Wetland 	Lake (name) 	River (name) 	Mountain Forest (public) 	Food market in town XXXX 	Local church 
Available all year-round	●●	●●●●●	●●●●● ●●	●●●●● ●●	●●●●	●●●●● ●●●	...
Inexpensive to obtain / produce	●●●●	●●●	●●●●● ●●●●●	●●●●● ●●●●	●●●●● ●●●●●	●	...
Volume of food obtainable	●●●●● ●●	●●●●●	●●●●● ●●	●●●●	●●	●●●●● ●●●●●	...
Products obtained can be exchanged for other types of food	●●●●● ●●●	●●●●● ●●●●●	●●●●	●●	●●	●●●●	...
...

Example. Scoring Matrix for Food Sources

8. Discuss the following topics with the participants:
 - a) Do they consider that the importance of the food sources, as shown in the matrix, is the same for all inhabitants of the community? How do they differ across local social groups (e.g., men, women, the elderly, the very poor, those living in specific areas of the village, etc.)?
 - b) Can all residents have equal access to these different food sources or do some face difficulties or restrictions? Why?
 - c) Does the observed importance of food sources, as shown in the table, change across seasons? How?
 - d) Are there any food sources that were used in the past (e.g., 2 decades ago) that are no longer available? Why?
9. Review your findings with participants. Ask them if they have any questions or additional comments.
10. Take pictures of the outputs produced.

4.14. Exercise N: Trend Analysis of Wild-Foods

What for?

- To identify and assess ES (in)direct contributions to food security.
- To outline changes in the supply of wild-foods.
- To identify and describe the drivers of changes in the provision of wild-foods.
- To describe potential future scenarios for the provision of wild-foods.
- To describe current adaptations and responses to changes in the provision of wild-foods.
- To describe potential future responses to address or reverse changes and support required.

Who with?

- We recommend conducting this exercise with two sets of informants: men and women, given that some may be more aware of changes in certain types of wild-foods associated with their domestic roles (e.g., hunters).
- In the case of women participants, the aim is to work with women responsible for cooking for their families (e.g., mothers or grandmothers).








What with?

- A spacious area / room.
- The list of food items generated in **Exercise M**.
- Flipcharts, a board or the ground.
- Coloured paper or cards.
- Writing / drawing material of different colours.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise. In general, you want to learn about the following:
 - ☒ How has access to wild-foods changed in the recent past?
 - ☒ What factors have led to these changes?
2. Start by reviewing the list of key foods that were reported to be obtained from the forest or other natural non-farm sources (**Exercise M**). Confirm with participants if they agree with the list or if there is anything they would like to add.
3. Write the name of the wild-foods on cards. If necessary, use symbols to represent the food items to identify them.
4. Ask participants to sort the cards in different groups according to the frequency of use for each season identified in the area (Seasonal Calendar: **Exercise L**). Group them according to the following frequencies:
 - i. Consumed most days of the week
 - ii. Consumed two or three times a week
 - iii. Consumed only once a week or less.

5. Take note of the wild-foods placed in the first group for each season. These may vary according to season so make sure that you work at most with 15 items. If the number of wild-foods obtained from natural sources is greater, ask participants to select the most important of this group.
6. Next, use only those wild-foods most regularly consumed in each season to generate a trend analysis (as explained in **Exercise K**, Trend Analysis on Land-Use). On this occasion, however, we are only interested in the stocks of each of the products named (i.e., quantities):
 - Ask participants to draw a matrix. In the rows, write the time periods they will use as reference to describe the historical trajectory of wild-food stocks. These could be decades or any other time interval that is meaningful to participants.
 - Put the name (or drawing) of one of the wild-foods in each of the columns. There is no need that they should follow a particular order.
 - Starting with the present, and working back through time, ask participants to assign a score to the stocks of the wild-foods listed. As a reference, you can ask them “if you give 10 to a period when there was plenty of [ITEM], how much would you give to the stocks available during [TIME PERIOD]?”
 - Ask participants to use seeds, stones or numbers to assign the scores. Make sure that ALL of them are able to read and interpret the scores correctly.
 - After you have finished the past and present, ask the participants how plentiful they think the stocks of each wild-food will be in ten years’ time.
 - Give participants a few minutes to check the scores assigned and make any changes they consider necessary.

TIME	Lulo 	Asai 	Agouti 	Tapir 	Armadillo 	Yam 	Brycon Fish 	...
30 years	***** ***	***** *****	***** *****	***** *****	***** **	*****	***** ***	...
20 years	***** *	***** ***	***** ***	***** ***	*****	***	***** ***	...
10 years	*****	***** *	***** *	*****	***	**	***** *	...
PRESENT	*****	*****	*****	**	*	**	*****	...
Future: 10 years	***** *	**	**			**	***	...

Example. Trend analysis on wild-foods

7. Discuss the following topics with the help of the trend diagram:

Changes in land use and ES

- a) What patterns or trends do participants perceive?
- b) What factors caused these changes? Which ones emerged locally (from the community or other local areas) and which ones were due to external processes (natural, such as climate change, or man-made, such as new laws, new roads, bridges, or changes in market transactions)?

ES contributions to livelihoods and well-being

- c) Have the observed trends and changes affected local livelihoods? How?
- d) Have the observed trends / trajectories affected residents' access to food or diets? How?

Responses / Adaptations to trends

- e) Have people changed their livelihood strategies to deal with these trends? How?
- f) Have residents modified their strategies to obtain food or deal with food shortages? How?
- g) Have there been any external interventions (from NGOs or the government) or policy restrictions (e.g., certain forms of forest use are now illegal) to manage or reverse these trends? Were they successful? Why?
- h) Have there been any local initiatives (either from the community or other local organisations) aimed at managing or reversing these trends? Were they successful? Why?
- i) Do participants consider that the community could do something else to control or reverse these trends? Why?

Views of the future and potential responses

- j) Ask participants to explain their depictions of the future. What factors did they consider?
 - k) Of all the negative changes identified, do they believe that some of them are now irreversible? Why?
 - l) What kinds of external interventions (from NGOs or the government) do participants believe would be necessary to reverse the negative trends identified?
8. Review your findings with participants. Ask them if they have any questions or additional comments.
9. Take pictures of the outputs produced.

4.15. Exercise O: Participatory Mapping of Wild-Foods

Why?

- To spatially locate wild-food sources and relevant flows.
- To identify changes in the supply of wild-foods.
- To describe spatial effects on access to wild-foods.

With whom?

- This exercise is best conducted with a cross-section of community members (10 at most). It should include both men and women of different ages as well as socioeconomic conditions and different cultural backgrounds, if relevant (ethnicity, religion, etc.). Group composition **MUST** include residents from different areas of the community.
- ☞ If the village is very large, you may work with certain clusters of households, which should be grouped according to their common use of certain non-farm areas (e.g., residents of the Northern part of the village may use a different section of the forest from those in the South).

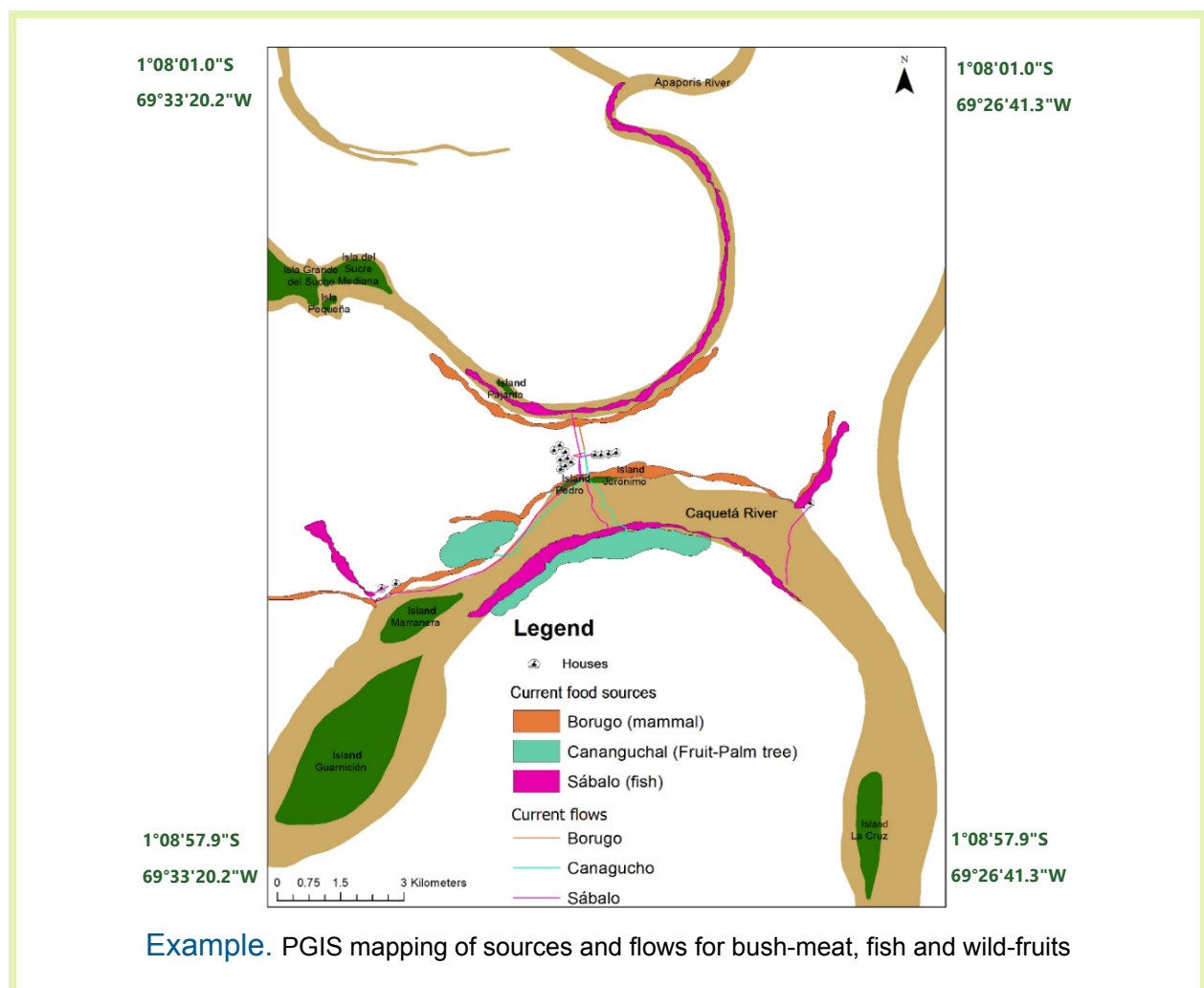
What with?

- A spacious area / room.
- The list of key wild-foods generated in **Exercise N**.
- An aerial view of the community or specific areas of it (if working with clusters).
- Transparent plastic sheets the size of the aerial view.
- Markers of various colours to use on transparencies.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the objectives of this exercise. In general you would like to know the following:
 - ☒ Where in the landscape can you find the sources of key wild-foods consumed in the community?
 - ☒ Have there been any significant changes in the presence and extension of wild-food sources in the community?
2. Refer to both the aerial view of the community and the updated community map generated previously (**Exercises G** and **I**). Using transparencies over the aerial view of the community, ask participants to draw the information for each wild-food (using different colours):
 - i. The areas (location and size) from where they are usually obtained.
 - ii. The paths by which these wild-foods are transported to residents' houses (grouped in clusters) or main roads (if used for sale).
 - iii. The areas where there is any obstacle or threat that may affect the transport of wild-foods into the community or roads (e.g., flood-prone areas).

- ☛ There is no need to trace the paths used to each individual household but only the main ones emerging from clusters of residences (e.g., if houses in the north of the community are relatively close together and use the same wild-food source area, trace a single path that reflects the most common shared route taken by those residents to access a given wild-food).
 - ☛ Make sure that every single transparency is properly labelled. Each of them should contain the North marker as well as the corresponding coordinates.
3. Based on the maps generated, ask participants about changes in the recent past (two decades ago or another time-period you consider relevant from your local knowledge). Looking at the layer for a specific product, ask about the past in relation to the following aspects:
- i. The area (location and size) from where these products were usually obtained in the past.
 - ii. The paths along which these wild-foods were transported to residents' houses (grouped in clusters) or main roads (if used for sale).
 - iii. The areas where there were any obstacles or threat that affected the transport of wild-foods (e.g., flood-prone areas).



4. Review your findings with participants. Ask them if they have any questions or additional comments.
5. Take pictures of the outputs produced
6. After the meeting, you should visit the main source areas for wild foods mapped in the company of key informants (e.g., experienced hunters for hunting grounds). As in the case of transect walks (**Exercise 1**), use GPS enabled cameras to take pictures of the areas whilst taking note of the coordinates that demarcate the area.

4.16. Exercise P: Food Security Focus Group

Why?

- To outline local understandings of 'food security' and relevant indicators.
- To identify seasonal variations in food (in)security.
- To identify and assess ES (in)direct contributions to food security.
- To identify changes in the ES (in)direct contributions to food security over time.
- To identify drivers of change in the ES (in)direct contributions to food security.
- To identify differences within households in terms of food security.
- To describe the coping strategies used to deal with seasonal and inter-annual food insecurity.

Who with?

- Work with a small group of informants (typically 10 at most).
- We recommend conducting this exercise with two different groups of informants: the better-off and the worse-off, given that their experiences of food security may differ substantively.
- If women and men have substantively different domestic roles, it may also be useful to conduct separate groups with them (e.g., if there is seasonal migration, women may stay at home looking after their children for a lengthy period of time).

What with?

- A spacious area / room.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise. In general, you want to learn about the following:
 - ☒ Are people from this village able to obtain nutritious food throughout the year?
 - ☒ To what extent do local natural resources affect residents' capacity to access food, either directly or indirectly (e.g., by generating income-generation activities)?
 - ☒ What do people do when facing food shortages?
2. Start by discussing how residents understand 'food security' and 'insecurity'. You may use the following prompts:
 - ☒ Is it just about having enough food to eat? What other factors matter?
 - ☒ When do they consider that their children are 'well-fed'? When do they consider they aren't? Why?
 - ☒ What do they consider a satisfying and healthy meal? Why?
3. Ask participants to establish local indicators of food insecurity at the household level. You can use the following prompts:
 - ☒ At what moment do they consider that their families are not well-fed?
 - ☒ Are there certain food items which, if missing from their diets, indicate that they are not eating well?

- ☒ How do they know that hunger is affecting their children's well-being / health?
- 4. Ask participants to establish local indicators of food insecurity at the community level. You can use the following prompts:
 - ☒ What elements tell them that the community as a whole is facing hunger?
 - ☒ What changes in diets or the way people obtain food indicate that hunger is worsening in the area?
 - ☒ How do they know that hunger is affecting most children in the community?
- 5. Present the list of products that were considered the most important by informants of the group discussion on food and their respective sources (**Exercise M**). Ask participants if they consider that this list indeed represents the key products that are part of their diets and the main sources used or if there is anything they would like to amend.
- 6. Taking into consideration the information reviewed, discuss the following issues:
 - a. **Availability:**
 - i. Are these products available throughout the year? Can they be obtained from a different source if not available from the usual one (e.g., the market if not available in the farm)?
 - ii. In general, how much of the food that is consumed each year is obtained from farms and home gardens? Are there any periods when the farm provides very little or no food?
 - iii. Do participants collect food from the forest and other natural resources (e.g., lake, river, swamp)? How much of the food they eat per year comes from these sources? Are there any periods when they cannot count on those food sources?
 - iv. Aside from the market or local natural spaces (e.g., lake, river, forest, etc.), are there any other important sources of food in the area (e.g., school food programmes)? Do they provide an important contribution to the diet? Why?
 - v. Even if participants have enough money, is there always enough food in the market? When there is scarcity, can participants rely on markets to access food? Why?
 - b. **Affordability:**
 - i. Do participants always need money in order to obtain food for their family? Are there any periods in the year when they do not need to get food from the market? Why?
 - ii. Are there any periods when residents cannot afford to buy food? What are the main reasons (e.g., lack of income or increase in prices)?
 - iii. Is there more than one place to go to buy staple foods? Which ones are used most? Why? Is it possible to save some money by visiting different markets?
 - iv. Is there any particular staple food whose prices fluctuate a lot across the year? Is it possible to replace it with a different product?
 - c. **Access:**
 - i. Are there any formal or informal norms that prevent people from accessing key natural resources (e.g., forests or rivers) to obtain food? Which groups are affected?
 - ii. Are there any formal or informal norms that prevent people from producing more food from their farms (e.g., limited access to irrigation, ineligible for farming subsidies)? Which groups are affected?

- iii. Are there any formal or informal norms that prevent people from earning enough money to buy food (e.g., hiring practices of wage labour may exclude women or men from certain ethnic minorities)? Which groups are most affected?
- iv. What happens within households? Do all family members eat the same food or do parents have certain preferences? Is it the same when there are food shortages?
- d. **Quality and Health:**
 - i. Do participants consider the food they normally eat is healthy? Why? Are there any particular times of the year when people eat less healthy food than normal? Why?
 - ii. Throughout the year, do participants have enough water and fuel-wood to prepare food the way they would like to? Are there any shortages that affect the way meals are prepared (e.g., fuel shortages)?
 - iii. When there are food shortages do people eat things they would not eat normally (use a local example); are there any health problems that arise from these dietary changes?
 - iv. In the long term, what health problems result from people facing repeated food shortages year after year? Which ones are most prevalent in the village?
- e. Explore **other dimensions** that may have emerged from the discussion in question 3. (e.g., if food security is associated with issues of social order, like conflicts or an increase in food theft):
 - i. How do these factors affect families' access to food?
 - ii. Are they present throughout the year?
 - iii. How do they affect residents' relations within the community? And with their neighbours from other communities?
- 7. Discuss if participants believe that the levels of food (in)security are similar across the community. Explore differences related to geographic, social, economic, or cultural characteristics (i.e., if there are significant differences between men and women; youth, adults, and the elderly; the poor as compared with the well-off; people living in other areas; or between ethnic / religious minorities).
- 8. Discuss whether participants believe that the levels of food security in the area have increased or decreased over time (e.g., as compared to 2 decades ago). In particular, explore the following:
 - a) Has their capacity to produce food in their farms decreased or increased over time? Why?
 - b) Has the volume of wild-foods they collect from local natural resources increased or decreased over time? Why?
 - c) Does the hungry season(s) last longer today than in the past? How much longer?
 - d) Do local markets offer more alternatives for acquiring cheap food than in the past? Are they adequate/healthy options?
 - e) Do they consider that the quality of food they consume has improved or worsened in the past decades?
- 9. Ask participants if there have been any external interventions, either from NGOs or the government, that have significantly affected the levels of food security in the area. Were the effects positive or negative? Why?

10. Ask participants to suggest what kind of external interventions or forms of support (from the government or NGOs) would help them to improve the levels of food security in the area. Ask for reasons.
11. Ask participants if they consider that the community can do something to improve their levels of food security in the area. Enquire about reasons.
12. Discuss the coping strategies people implement during periods of food shortages:
 - ☒ Ask people to describe what kind of things they do in order to obtain food for their families in periods of food shortages. Generate a list of coping strategies.
 - ☒ Discuss which coping strategies participants believe to be the most effective and why.
13. Ask participants if they have any questions or additional comments to make.

4.17. Exercise Q: Food Insecurity Cause-Effect Diagram

Why?

- To identify changes in ES (in)direct contributions to food security.
- To identify the effects of changes in ES on food security, local livelihoods and well-being.
- To describe current adaptations and responses to food insecurity.
- To identify potential future scenarios on ES provision, land use, and community's food security.
- To identify potential future responses to manage or reverse trends in land use and ES affecting residents' food security.

Who with?

Make sure that this exercise is relevant to the study site. Unless the communities face regular periods of food scarcity, this kind of exercise may not be relevant since residents cannot establish adequate links between drivers and pressures.

- You can conduct this exercise with a cross-section of the community (e.g., poor and better-off residents, neighbours from different areas, men and women, etc.) if hunger is present across all social groups in the area.
- If hunger is experienced by certain sectors in particular, it may be useful to undertake this exercise with separate groups according to whether their experience with this issue is direct or indirect.

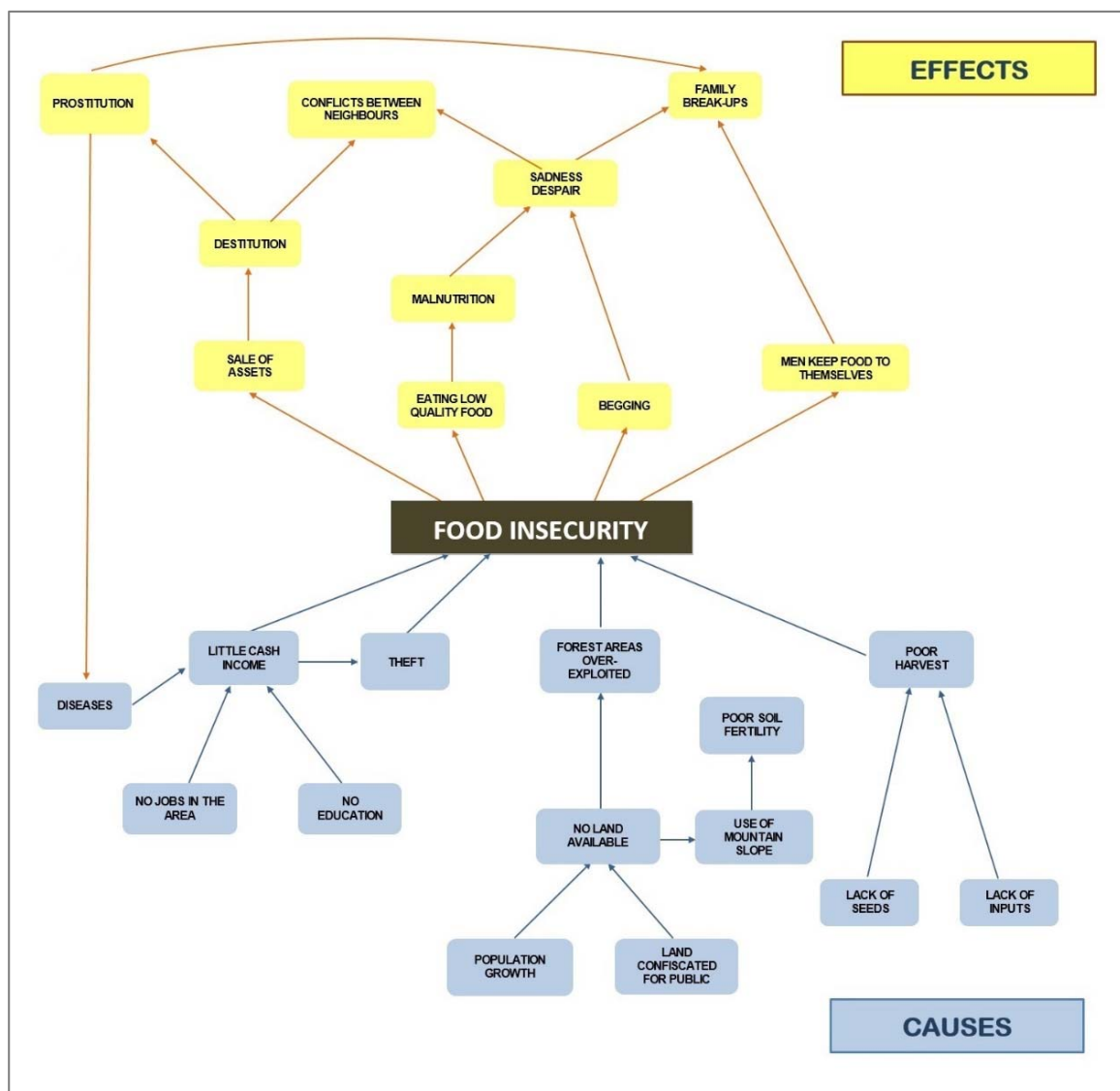
What with?

- A large space / room.
- Coloured paper or cards.
- Writing / drawing materials of various colours.
- Flipcharts, a board, wall or the ground.
- A camera to register all the material produced during the meeting.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise to participants. In general, you want to learn about:
 - ☒ What factors do participants perceive to be the causes of food shortages in the area?
 - ☒ What are the consequences of food insecurity in the area?
2. Briefly present the definition of 'food (in)security' developed in the previous exercise (**Exercise P**). Make sure most participants understand the topic and agree on a general definition.
3. Write the title FOOD INSECURITY in bold letters and place it at the centre of the flipchart, black board, ground, etc.
4. Ask participants to discuss / brainstorm the multiple causes of the phenomenon. Make a list of them in no particular order.

5. Write the causes identified on cards (or draw them). Place them on the lower half of the diagram (their specific location may be adapted according to space available).
6. Ask participants to specify if they believe the relationship with food insecurity / hunger is direct (e.g., food theft or rustling -> food insecurity) or indirect (e.g., diminishing rains -> poor crops -> food insecurity). Connect them using arrows.
7. Discuss with participants if the causes identified, in turn, have some other processes or factors generating them, (e.g., limited water availability for irrigation -> poor crops -> food insecurity; but 'limited water availability' may, in turn, be caused by 'erratic rains' or 'increasing water consumption upstream by other villages').
8. Read all identified causes to the participants and ask for any confirmation or additions.



Example. Cause - Effect diagram

9. Repeat the same process for the effects, placing them on the top half of the chart. Make sure that effects include people's reactions to cope or deal with food insecurity (e.g., seasonal migration).
10. Ask participants if there are any links between causes and effects. To avoid excessive circularity, focus only on the most important ones.
11. Ask the participants to review the diagram and check for corrections or additions.
12. Analyse the diagram with participants:

Local food insecurity: drivers / pressures

- a) What causes do informants consider the most important? Why?
- b) Which of the effects listed do they consider to have the greatest impacts on their well-being? Why?
- c) To what extent have the causes identified increased or decreased (improved or worsened) in the last 2 decades? What about the effects?
- d) What causes of food insecurity do participants believe are beyond the community's capacity to resolve? Why?

Responses / Adaptations

- e) Have there been any initiatives from the community to improve any of these factors (either causes or effects)? What were the results? Why? (If none were organised, why?)
- f) Have there been any initiatives from the government, NGOs or other external agencies to improve any of these factors? What were the results?

Potential future responses

- g) What kind of community initiatives do participants believe could be organised to improve food security in the area?
- h) What kind of interventions – either from NGOs, international agencies, or the government – do participants believe would be useful to address some of the causes of food insecurity in the area or their effects? Why?

13. Review your notes with the participants. Ask if they have any questions or comments.
14. Take pictures and reproduce the matrix.

4.18. Exercise R: Community Timeline on Food Security

Why?

- To outline changes in local livelihoods and living conditions in the recent past.
- To depict perceived inter-annual changes in food security.
- To outline changes in the supply of wild-foods.
- To identify key drivers leading to changes in local livelihoods and living conditions.
- To identify key drivers leading to changes in food security.
- To identify key drivers leading to changes in the supply of wild-foods.
- To describe current responses and adaptations aimed at addressing food security issues.

Who with?

- Work with a small group of key informants who are knowledgeable on the history of the community. This should include community leaders and elders. We recommend that you include one or two respected younger members of the community as well.
- For communities with 'large' populations (e.g., over 100 households), it may be useful to carry out this exercise with different groups, according to the likelihood of their having experienced different historical trajectories with livelihoods and food-security (e.g., residents of different well-being status).
- ☞ Be aware that local customs may prevent young residents from participating freely in discussions where figures of authority are present. In such cases, you may need to work with separate groups.

How?

1. Explain the purpose of the exercise. In general, you want to learn about the following:
 - ☒ The history of the community.
 - ☒ The main events that have affected the capacity of residents to produce food locally or to obtain enough income to acquire it.
2. Start by discussing the general history of the community. When was it founded and when were key landmarks built (e.g., school, road, irrigation canals, boreholes)?
3. Ask one person who has lived in this area the longest to identify the major events in the history of the community that changed people's living conditions and livelihoods in the area (e.g., when was maize first introduced in the area or a new access road built).
Establish the date when these events took place (a rough estimate is OK). Ideally, identify events at 10 year intervals, and distinguish between national and local events. Other participants may help to complete the list after the initial list of events is developed by the key informant.
4. Ask participants to identify any key external interventions that have affected their livelihoods and living conditions (e.g., when the government introduced a system of subsidies for seeds and fertilizers).
5. Ask participants to identify any key events in the community's history that affected people's access to food either temporarily (e.g., a severe drought) or permanently (e.g., drying up of a local river). Include both negative (e.g., famines, droughts, pests) and positive events (e.g., development projects either by the government or NGOs).

6. Review the list of events and confirm with the group their chronological order and estimated dates. Order them in a column.

DATE PERIOD	EVENTS	GENERAL IMPACTS ON LIVELIHOODS AND LIVING CONDITIONS.	EFFECTS ON FOOD SECURITY
1940s	<ul style="list-style-type: none"> Starts the commercialisation of skins from wild animals. First school opens in the region (missionaries). A military base is established in the main town. 	<ul style="list-style-type: none"> Residents start accessing cash. Some individuals opt to work only in commercial activities. Presence of soldiers expand local market activities and exchange with indigenous residents. There are attempts to limit the use of indigenous dialects. 	<ul style="list-style-type: none"> Some residents stop conducting traditional subsistence, they rely more on non-local food products. There is a greater diversity of food items to choose (from the market). Residents with greater access to cash can improve their diets.
1950s	<ul style="list-style-type: none"> Residents trace the boundaries of their community. Residents start dialogue with public authorities to recognise its territory Logging for commercial purposes begins. Commercialisation of skins and hides continues. 	<ul style="list-style-type: none"> Game and birds become scarcer, hunting becomes more difficult. Residents start cultivating wider and more plots of land. Access to cash becomes more common among residents. 	<ul style="list-style-type: none"> People have more access to crops and food items (from market) General good access to food among residents.
1960s	<ul style="list-style-type: none"> Increase in inward migration. Many indigenous families move to access school and services from the town. Increase in the presence of commercial traders in town. Planes start arriving to the area. Commercialisation of skins and hides peaks 	<ul style="list-style-type: none"> Substantial population growth. Further clearance of forest areas for agricultural purposes. Increase in families engaged in commercial activities. Some start conducting their own businesses. Most are still engaged as labour or suppliers. More manufactured products available. 	<ul style="list-style-type: none"> Increase in the overall agricultural production. Increase in demand for processed food items (e.g., pasta and rice).
1970s	<ul style="list-style-type: none"> More migration, but in surrounding areas. Most are indigenous groups. Commerce of skins and hides decreases. Village and forest use areas are officially recognised by the government (1975). Government recognises indigenous reserves. First freezer to store fish is established (1978). Logging increases in the area (for building). 	<ul style="list-style-type: none"> However, some families engaged in commercial activities start move to town. There is an increase in more intensive forms of fishing for commercial purposes. Some species of trees are becoming more scarce, particularly those used as construction materials. 	<ul style="list-style-type: none"> Overall access to food is considered adequate. Local families start using manufactured products as supplements to local produce.
1980s	<ul style="list-style-type: none"> Gold mining appears in the area. More migration. A combination of factors: escaping from political violence elsewhere and to engage in gold mining. Logging continues (for building). Commercial fishing becomes more widespread. 	<ul style="list-style-type: none"> A few leave farm work for gold mining or commercial fishing. Greater engagement of families in commercial activities indirectly, by selling produce to the town market, since population increased substantively. Cost of living increases substantively. 	<ul style="list-style-type: none"> Large species of fishing become more difficult to catch. Hunting becomes more difficult Overall produce decreased as families were more engaged into commerce.
1990s	<ul style="list-style-type: none"> Gold mining decreases substantially. Some families leave the area. Communities found a regional association (1993). Some conservation measures become adopted to prevent further deterioration of resources: fishing with dynamite and large nets are forbidden (1995). Minor commercial fishing subsists. 	<ul style="list-style-type: none"> Decrease in commercial activities gold mining decreased. Residents reconvert to farming and gathering. Cost of living remain high. 	<ul style="list-style-type: none"> People who relied on cash income endured a period of scarcity before reconverting to subsistence-oriented livelihoods. Large animals and species of fish are still difficult to catch.
2000s	<ul style="list-style-type: none"> There are some conflicts with non-indigenous colonists. School restaurant giving free meals to students opens in 2005. Droughts: 2005 and 2010. Communities and regional organisation adopt a conservation management plan (2006), setting hunting quotas, guidelines for fishing practices and protected areas within each indigenous reserve. 	<ul style="list-style-type: none"> No major changes in livelihoods as compared to previous decade. Some youth start migrating to major cities. School enrolment increased due to new benefits. 	<ul style="list-style-type: none"> Some species of fish, game and trees are starting to come back. Many families are, however, now used to consume manufactured products from the town market. During the most severe months of droughts, government distributed some food and cash transfers to affected families. However, there was no starvation.

Example. Community timeline using 10-year time periods

7. Ask the informants to describe the main changes generated by the events identified in terms of livelihoods and living conditions (e.g., with new road it was easier to sell local produce in the market so that access to cash increased in the community). Make sure to obtain a description of local material conditions before the event. Write a summary of these changes in a new column next to the timeline of events.
8. Next, ask participants to describe the effects of these changes over the community's access to food and general well-being. Enquire about how these processes took place (e.g., greater access to cash among residents prompted them to rely more on products from the market, leading to a change in diets).
- ☞ Make sure that, in your chart, you have enough space after each event so that others can be inserted if they come later in the discussion.
9. After the table has been generated, ask participants to identify which of the events listed they consider to be the most important to explain their current situation in terms of living conditions and food security. Ask them why.
10. Ask participants if they consider that the different external interventions, either from NGOs or the government, have helped them in the long-run to improve their living conditions and food security. Ask them why.
11. Review your summary of events with participants and ask for any additions or amendments.

4.19. Exercise S: Coping Strategies Focus Group

Why?

- To describe the coping strategies used locally to deal with food scarcity.
- To rank the coping strategies used according to their severity.
- To outline the main social, economic, spatial or environmental factors affecting households' capacity to adopt coping strategies.
- To identify a list of wild-products used in times of food scarcity.
- To describe historical changes in the adoption of coping strategies.
- To outline the main drivers of historical change in the adoption of coping strategies.

Who with?

- You need to conduct this exercise with different groups according to key variables affecting households' food security status (e.g., landholding, ethnicity, sex, etc.). We recommend that, as a minimum, you contrast better-off and worse-off residents.
- ☞ In contexts of significant temporary migration you may need to contrast groups of residents who stay put during periods of scarcity (usually women) with those who migrate seasonally.

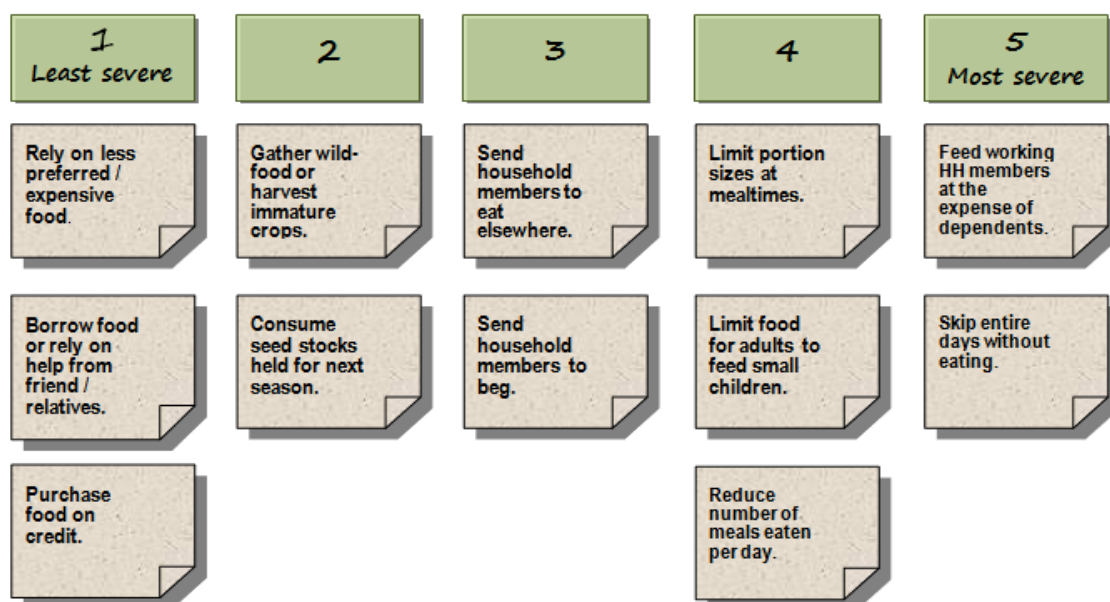
What with?

- A large space / room.
- Writing / drawing materials of various colours.
- A flipchart, board or the ground.
- A camera to register the material produced during the meeting
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise. In general, you want to learn about the following:
 - ☒ *What measures do people take in order to deal with food shortages?*
 - ☒ *How do people cope with food shortages under extreme circumstances?*
2. Review with participants the main definition of 'food (in)security' developed in previous exercises as well as the main food security issues the local population face at present (**Exercise P** Food Security FG, and **Exercise R** Community Timeline on Food Security). Ask them if they agree with these key findings.
3. Begin a brainstorming session about the different strategies residents adopt in order to cope when they have no access to adequate food or lack the means to acquire it. Explore local variations on the following general coping strategies:
 - ☒ Changes in diet (in terms of the type and quality of food products consumed).
 - ☒ Rationing strategies (e.g., reducing portion size, feeding children instead of adults, feeding working members at the expense of dependents, etc.).
 - ☒ Short-term increases in food access (e.g., buying on credit, borrowing money, selling assets, etc.).
 - ☒ Exploitation of local natural resources (e.g., harvesting wild foods, hunting wildlife, etc.).
 - ☒ Changes in the number of household members to feed (e.g., sending children to stay with relatives or forced temporary migration).

4. People may generate an extensive list of strategies; make sure you explain the following inclusion criteria to participants:
 - ☑ Coping strategies refer to practices adopted specifically during times of scarcity, not to practices used routinely for acquiring food (e.g., buying food on credit may be a practice performed customarily throughout the year).
 - ☑ Strategies adopted during extreme one-off events should not be included (e.g., hunting certain types of animals may have occurred once during a severe drought a decade ago but it is not a regular practice).
 - ☑ Participants should be able to adopt and reverse coping strategies as their food requirements demand it (e.g., they may eat some wild-foods during a drought but go back to normal afterwards).
5. If the list of coping strategies is too extensive (e.g., over 15), ask participants to identify those strategies that have been more commonly used in the past decade.
6. Write each of these coping strategies on a card. Use symbols to represent them if necessary.
7. Sort and group the coping strategy cards according to their 'severity' (i.e., the most severe are used under the most extreme circumstances whilst the least severe are the ones used when food shortage is mild):
 - Try to group the coping strategies into 4 to 5 different categories of severity.
 - Identify first the most and least severe strategies. Number '1' will represent the least severe coping strategies and '5' the ones used under the most extreme circumstances.
 - Proceed to ask if the others are similar in terms of severity or are placed in an intermediate category.
 - Once all coping strategies have been grouped, review the results with participants and ask if they want to make any modifications.



Example. Sorting coping strategies according to severity using cards

Note: Derived from Maxwell & Caldwell (2008).

8. On a flipchart, write each coping strategy in a row and add five columns titled: (i) conditions needed, (ii) triggers, (iii) examples, (iv) time, and (v) consequences.
9. Ask the following questions for each of the coping strategies, starting with the least severe one and fill in the corresponding cell (go through all five topics before moving to another coping strategy):
 - a) CONDITIONS: What resources and conditions are necessary to make a coping strategy work? What factors determine whether you can adopt a coping strategy successfully or not? Explore both material and non-material factors (e.g., credit to buy food may be obtained only by homeowners; obtaining enough wild-food to feed a family may demand considerable help from family members; sending children eating elsewhere may work only if better-off relatives live nearby, etc.).
 - b) TRIGGERS: What factors make people decide it is necessary to adopt a particular coping strategy? Explore material (e.g., lack of cash or assets to sell) and social factors (e.g., no relatives in town) as well as environmental issues (could be big events, like a 2-year drought, or small consecutive ones, such as brief periods of shallow rains during the rainy season, which ruined water-demanding crops).
 - c) EXAMPLES: Can participants provide any historical examples of when villagers adopted these coping strategies? What were the environmental and socio-economic circumstances of the time (e.g., people resorted to begging after two years of droughts, when government's food donations were suspended or during a period of inflation?). If possible, specify the year when events occurred.
 - d) TIME: For how long can people usually get by using a given coping strategy? Why? (General estimates are ok).
 - e) CONSEQUENCES: Are there any negative effects that result from implementing a coping strategy either in terms of health, social standing, or economic obligations? (e.g., repayment of credits and loans may imply selling next harvest at very low prices or working for free; prostitution risk, HIV, etc.).
10. Ask the following for those coping strategies that involve changes in diet or the consumption of wild-foods:
 - a) What products do people normally collect, harvest or hunt from local natural resources during periods of scarcity (e.g., mushrooms, nuts, etc.)?
 - b) Are these products collected within the village boundaries or in other parts of the district?
 - c) How far do people need to travel in order to access these areas (specify the time required)?
 - d) Do people face any problems when trying to access these areas in periods of scarcity? Do they have any conflicts with neighbouring villages or local authorities?
11. Review the list of coping strategies with the group of participants. Discuss the following general questions:
 - a) How did they decide that one strategy is more severe than another? What factors did they consider?
 - b) Are there any groups of residents that are unable to implement some of the coping strategies listed (e.g., men, women, elderly couples, the very poor, some who live in specific parts of the village)? Why?

- c) Are there any differences in the coping strategies that people use nowadays compared with those used 2 decades ago (use your local knowledge to choose a suitable time-frame)? What are the main differences?
- d) Why do participants believe these changes in coping strategies happened? Do they think that such changes were caused by variations in the condition of local natural resources (e.g., a reduction of forest areas may imply a more limited capacity to access wild-foods)?

Coping strategies	Severity Group	Conditions / Resources needed	Triggers	Examples	Time family can get by	Negative consequences
Rely on less preferred / expensive food.	1	<ul style="list-style-type: none"> Local markets have variety of cheap foods. Family has some cash savings. Family members are healthy. Wild-foods are still possible to obtain from forest, rivers and lake. 	<ul style="list-style-type: none"> Food stocks will not last more than a month. Usually when there was less rain than expected (shallow rains during most rainy season). Crop yields are not enough. Little work around due to poor crops. 	<ul style="list-style-type: none"> Almost every year. In 2011 families that have only rain-fed farmland had little water for main agricultural campaign. Seasonal rains were not enough. Shallow rains for three months. 	<ul style="list-style-type: none"> 3/4 weeks (depending on family size and savings or food stocks) 	<ul style="list-style-type: none"> Sometimes the cheap food is not well-preserved. Children get stomach problems. Children don't like it. Requires more time to cook and more firewood.
Borrow food from friends or relatives.	1	<ul style="list-style-type: none"> You need good friends and close relatives nearby. Newcomers (tenants) have more problems. You need to have a few well-off relatives. Based on reciprocity, you need to be able to return the favour (some savings or assets are needed). 	<ul style="list-style-type: none"> Food stocks are close to empty. Income does not compensate for the lack of food. Poor crop yields to lack of irrigation and rain. 	<ul style="list-style-type: none"> Almost every year. Last year (2011), same period as described before. 	<ul style="list-style-type: none"> 2 or 3 weeks, depending on wealth and extension of connections / relatives. 	<ul style="list-style-type: none"> Conflicts with relatives if cannot return favour. On occasions one has to repay in labour. May receive no or little payment for a lot of work.
Gather wild-food or harvest immature crops.	2	<ul style="list-style-type: none"> You need help from many family members to gather enough food. It takes time. You need to be healthy since you have to walk far and spend time under sun. Wild-foods have not yet been depleted by residents. 	<ul style="list-style-type: none"> Food stocks are empty. There is no work available. Almost no money to buy in market. When droughts or floods ruin most local crops (district / valley level). 	<ul style="list-style-type: none"> Three years ago (2009) during a drought. The rainy season lasted less than 1 month. Most crops failed. 	<ul style="list-style-type: none"> 2 or 3 weeks of food, depending on competition and season. 	<ul style="list-style-type: none"> Food is mostly low quality. People become thinner and have stomach problems. Due to competition, neighbours sometimes are in conflict. Fights may occur. People don't talk to each other.
Restrict consumption by adults in order to feed small children.	4	<ul style="list-style-type: none"> Adults and teenagers need to be rather healthy. Family still has some forms of access to some food. 	<ul style="list-style-type: none"> Food stocks empty. Children are getting ill. No support from friends / relatives. Food shortages have been going on for more than 6 months. No rains for two years (crop failures for two consecutive years). 	<ul style="list-style-type: none"> 9/10 years ago (2001-2002). Severe droughts affected the region for two years. Most crops failed and there was no work in the area (general crisis). Adults and eldest sons migrated temporarily or permanently. Some aid was given but poor distribution (only a few benefitted). 	<ul style="list-style-type: none"> 1 or 2 weeks at most, depending on number of children and health of adults. 	<ul style="list-style-type: none"> Adults get sick. Children are still eating low-quality food, getting sick and not eating enough. Family break-up, members move away. Adults may become thieves.
...
...

Example. Coping strategy Matrix

12. Review your notes with participants. Ask them if they have any questions or comments to add.
13. Copy the table and take pictures of it.

4.20. Exercise T: Focus Group and Trend Analysis on ES

Why?

- To identify the (in)direct contributions of ES benefits to local livelihoods.
- To identify any negative effects from nature.
- To describe intra-household differences in terms of access to and use of ES benefits.
- To describe existing rights of access to and ownership of local natural resources.
- To identify any existing forms of competition or struggles over access to and use of ES benefits.
- To outline key changes on ES (in)direct contributions to livelihoods in recent decades.
- To outline key changes on ecosystem disservices.
- To describe current adaptations and responses to changes in ES relevant to local livelihoods.
- To identify potential future responses to manage or reverse trends in land use and ES affecting residents' livelihoods.

Who with?

- This exercise is best conducted with a cross-section of the community. Include residents that have been living in the area for a long time, men and women, and from different geographical areas.
- If the study area is very large, it may be practical to conduct this exercise with different groups of informants, each from different geographical areas.

What with?








- A spacious area / room.
- A flipchart, board or the ground.
- Writing / drawing materials of different colours.
- Coloured papers or cards.
- Local materials that can be used as markers (seeds, stones, etc).
- A camera to register all the material produced.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise. In general, you want to learn about the following:
 - ☒ How do the natural resources present in the community contribute to local livelihoods?
 - ☒ Are all members of the community able to access and use these resources?
 - ☒ What is the current condition of these resources and their main trend: are they decreasing or increasing?
2. Begin by discussing the idea of ES as benefits from nature that support people's livelihoods and daily practices through the provision of diverse resources (e.g., firewood used for cooking and for sale, irrigation water from rivers or rain, or game for sale).
3. Ask people to brainstorm their dependence on products from nature to conduct their main productive activities and domestic practices (e.g., health, education, or cultural activities). Generate an initial list of ES.

4. Make people aware that natural resources not only provide benefits but may also generate negative impacts (e.g., rivers may be prone to flooding, swamps bring mosquitoes and so malaria). Ask people to brainstorm these negative effects from nature that affect their productive activities and general well-being (e.g., health, education, or cultural activities). Generate an initial list of ecosystem disservices.
5. Farming:
 - a) Ask participants to identify the most important benefits they obtain from nature that are useful for their farming activities. Include both agriculture and livestock rearing (e.g., forest resources used as fodder or water sources used for irrigation of farmland). Prompt them to identify any final ES that have not been listed in the initial discussion (question 3).
 - b) Ask participants during which months of the year they usually make the greatest use of these ES and why.
6. Non-farm productive activities. Follow the same steps:
 - a) Ask participants to identify ES that are considered the most useful for other key productive activities (e.g., crabs collected from the river may be commercialised as well as firewood collected from the forest).
 - b) Ask participants during which months of the year they obtain these products the most and why.
7. Health. Ask participants to identify those ES that are considered important to protect or improve residents' health either by enhancing their health or by serving as medicines to treat common diseases. Then ask about the periods of time when demand is higher and why.
8. Daily practices. Ask participants to think about other ES that might be relevant to their daily lives. Include both those resources relevant for material living conditions (e.g., sources of drinking water, cooking fuel or construction materials) and for socio-cultural activities (e.g., sacred groves for rituals or forest resources for traditional celebrations). Then follow the same steps from the previous questions.
9. Disservices. Once all potential ES have been covered, ask participants to identify any negative effects generated by local natural resources that affect their livelihoods and general well-being. Ask participants to identify the times of the year when these problems occur and why.
10. Update the initial list of ES benefits and negative effects (steps 3 and 4) with the information from the last discussions. Read it to the participants and ask them to select which ones have the greatest effects on their lives. Do the same with the list of negative impacts from nature. If the lists are too long, ask participants to select the 10 most important.
11. Conduct a **TREND ANALYSIS** exercise for ES and disservices. Follow a similar procedure used for **Exercise N** (Trend analysis on wild-foods):
 - Select time landmarks. You can use time intervals (e.g., decades) or identify certain years that had a significant effect on access or provision of final ES.
 - Outline a matrix with the list of final ES in columns and the time periods in rows.
 - Take up **one** ES or disservice and ask participants to depict the situation today and then go backwards through each time-period.

- After discussing the present and past, ask participants what they think will be the state of this service / disservice in 10 years' time.
- Repeat this process for each aspect listed until the matrix is filled.
- You may quantify changes using symbols, drawings, or markers (seeds, stones, etc.).

TIME PERIODS	ES BENEFITS					ES DISBENEFITS	
	Irrigation water (river) 	Fish from the lake 	Firewood (forest) 	Mushrooms (forest) 	Fruits (forest) 	Mosquito-borne diseases (swamps) 	Pests (forests) 
30 years ago	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
20 years ago	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
10 years ago	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
PRESENT	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
10 years future	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●

Example. Trend analysis on non-food related ES

12. Discuss the chart with participants:

Changes in ES and disservices

- Do participants perceive any clear trends in the reported changes of ES?
- Do participants perceive any clear trends in the reported changes of ecosystem disservices?
- What are the main reasons for these changes? Which ones do they believe were the responsibility of the community and which ones were due to external factors (e.g., natural factors like increasingly erratic rains, or man-made factors like the construction of a dam)?
- Present the main findings regarding changes in land use to the participants (**Exercise 10**). Do they believe there is any relationship between those changes and the observed changes in the provision of ES benefits or prevalence of disservices?

ES contributions to livelihoods and well-being

- How have these changes affected residents' economic activities? Why?
- To what extent have these changes affected residents' food security and health? Why?

Responses / Adaptations to trends

- How have residents adapted their daily practices (e.g., cooking, building, etc.) to these changes?
- Have people changed their livelihood strategies to deal with these changes / trends? How?
- Have there been any external interventions (from NGOs or the government) or policy restrictions (e.g., certain forms of forest use are now illegal) to manage or reverse those trends? Were they successful? Why?

- j) Have there been any local initiatives (either from the community or other local organisations) aimed at managing or reversing these trends? Were they successful? Why?
- k) Do participants consider that the community can do something else to control or reverse these trends? What and why?

Future scenarios

- l) Ask participants to explain their depictions of the future. What factors did they consider?
 - m) Ask participants if they believe any of the trends identified are irreversible and why.
 - n) Ask participants if they believe that the community can organise any initiatives to control or reverse these trends? What aspects do they believe are beyond their capacity to intervene?
 - o) Ask participants to suggest what kind of external interventions (from NGOs or government) would be necessary to improve the condition of the aspects listed.
13. Review your notes with participants. Ask them if they have any questions or comments to add.
14. Copy the chart / graph and take pictures of it.

4.21. Exercise U: PGIS Mapping of ES for Livelihoods

Why?

- To spatially locate sources of ES for livelihoods and relevant flows for local use and trade.
- To spatially locate sources of ES for domestic use and relevant flows for local use.
- To identify changes in the stocks of ES for livelihoods and domestic use.
- To describe spatial effects on access to ES for livelihoods and domestic use.

With whom?

- This exercise is best conducted with a cross-section of community members (10 at most). It should include both men and women of different ages as well as socioeconomic conditions and different cultural backgrounds, if relevant (ethnicity, religion, etc.). Group composition **MUST** include residents from different areas of the community.
- ☞ If the village is very large, you may work with certain clusters of households, which should be grouped according to their common use of certain non-farm areas (e.g., residents of the Northern part of the village may use a different section of the forest from those in the South).

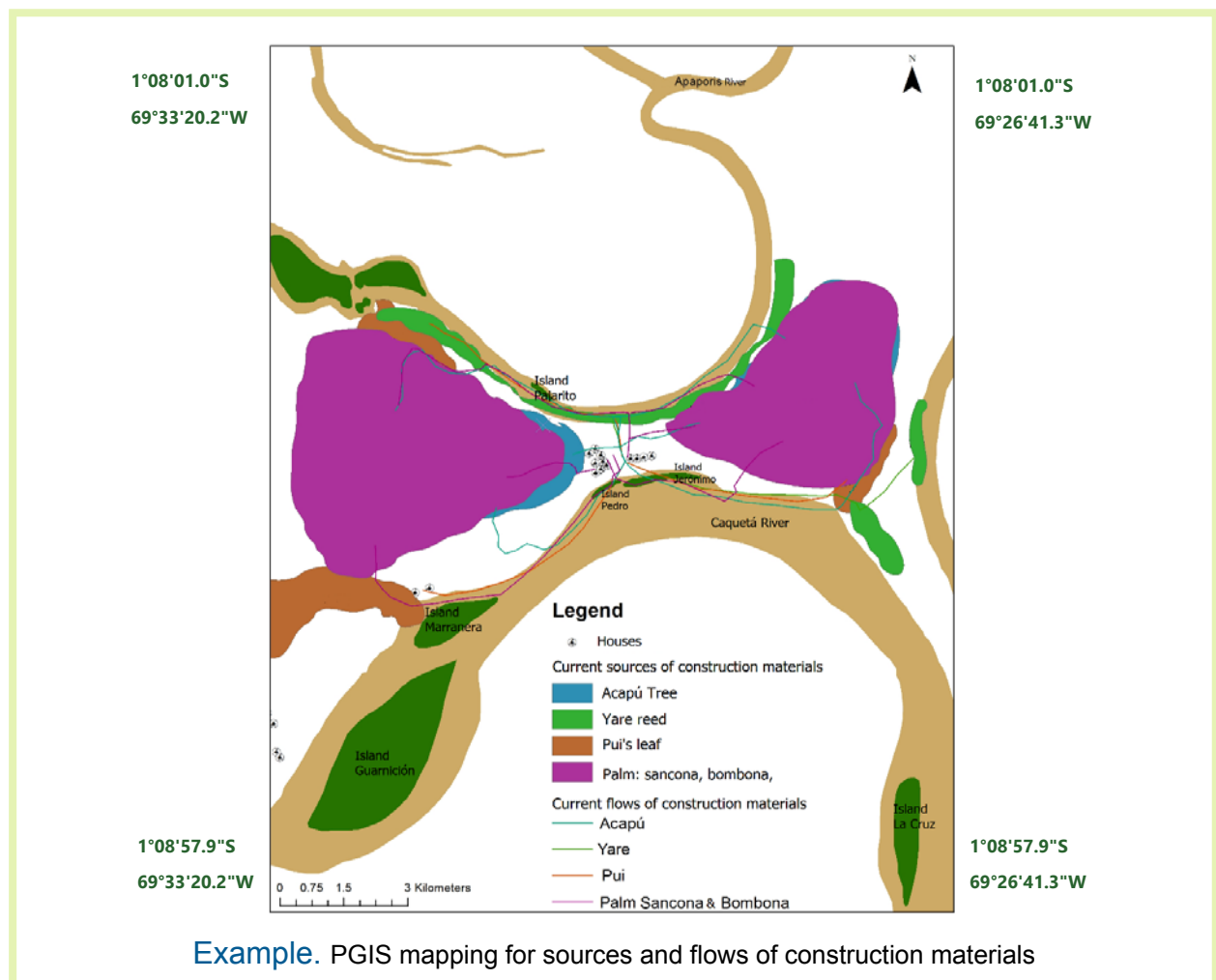
What with?

- A spacious area / room.
- The list of key ES generated in **Exercise 1**.
- An aerial view of the community or specific areas of the community (if working with clusters).
- Transparent plastic sheets the size of the aerial view.
- Markers for transparencies of various colours.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the objectives of this exercise. In general you would like to know the following:
 - ☒ *Where in the landscape are the sources of ES that support local livelihoods?*
 - ☒ *Have there been any significant changes in the presence and extent of ES sources in the community?*
2. Use both an aerial view of the community and the updated community map generated previously (**Exercises 6 and 1**) as reference. On transparencies laid over the aerial view of the community ask participants to draw the following information for each ES and every ecosystem disservice identified in the trend analysis (**Exercise 1**). Use different colours for each ES / disservice:
 - i. The areas (location and size) from where they are usually obtained.
 - ii. The paths by which these ES are transported to residents' houses (grouped in clusters) or main roads (if used for sale). Be aware that this does not apply for disservices.
 - iii. Any areas where there is an obstacle or threat that may affect the transport of ES into the community or roads (e.g., flood-prone areas). Be aware that this does not apply for disservices

- ☞ There is no need to trace the paths used to each individual household but only the main ones emerging from clusters of residences (e.g., trace one single path to describe the main route taken by residents from neighbouring houses to access a given ES source area).
 - ☞ Make sure that every single transparency is properly labelled. Each of them should indicate North as well as the coordinates for border markers.
2. Taking the maps generated as a reference, ask participants about changes in the recent past (two decades ago or another time-period you consider relevant from your local knowledge). Over the layer for each specific ES / disservice, ask about the past in relation to the following aspects:
 - i. The area (location and size) from where these ES were usually obtained in the past.
 - ii. The paths by which these ES were transported to residents' houses (grouped in clusters) or main roads (if used for sale) in the past. Be aware that this does not apply for disservices.
 - iii. The areas where there were any obstacles or threat that affected the transport of ES (e.g., flood-prone areas). Be aware that this does not apply for disservices.
 3. Review your findings with participants. Ask them if they have any questions or additional comments.



Take pictures of the outputs produced

4. **After the meeting**, you should visit the main source areas for ES / disservices mapped in the company of key informants (e.g., experienced hunters for hunting grounds). As in the transect walks (**Exercise 1**), use GPS enabled cameras to take pictures of the areas whilst taking note of the coordinates that demarcate the area.

4.22. Exercise V: Cause-Effect Diagram for Changes in ES

Why?

- To identify the effects of changes in ES provision on local livelihoods and well-being.
- To identify direct and indirect drivers that affect ES provision.
- To assess the relative contribution of (in)direct drivers on observed trends in ES provision.
- To describe current adaptations and responses to changes in ES provision.
- To depict potential future scenarios on ES provision.
- To identify potential future responses to manage or reverse changes in ES that negatively affect local livelihoods.

Who with?

- Identify two or three different topics of discussion according to the main trends identified in Exercises ⑧ (Land Use FG) and ⑨ (Ecosystem Benefits FG) (e.g., soil fertility, forest or water management) that the participants consider relevant. You should create a different cause-effect diagram for each topic.
- Participants should include community specialists on the use and management of key ES benefits (i.e., a group of forest users and leaders of local forest committees if forestry is being discussed; a group of farmers with access to irrigation together with leaders of the water user association, if water for irrigation is being discussed, and so on).

What with?

- A large space / room.
- Coloured paper or cards.
- Writing / drawing materials of different colours.
- A flip chart, board, easy-to-clean wall, or the ground.
- A camera to register all the material produced during the meeting.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purpose of the exercise. In general, you want to learn about the following:
 - ☒ What do participants think are the causes of observed changes in the provision, quality or intensity of ES / disservices?
 - ☒ What are the consequences of these changes for local livelihoods and food security?
2. Present the topic of discussion based on the relevant findings from the previous exercise (e.g., observed changes in water for irrigation, availability of forest products, etc.). Ask participants for their own views on this matter.
3. Generate a cause-effect diagram on the topic in discussion. Follow the same steps as in **Exercise ⑩** (Cause-Effect diagram on Food Insecurity):
 - Write the title of the discussion on a card. Make sure the topic refers to changes in a particular ES benefit / disservice (e.g., decreasing soil fertility, declining irrigation water availability or diminishing availability of forest wild-foods).
 - Ask participants to brainstorm the potential causes of the phenomenon.
 - Sort all potential causes according to whether they are direct or indirect effects.

- Relate all causes using arrows.
- Repeat the same process with the effects of changes in the provision, quality or intensity of ES / disservices.
- Make sure you also explore the potential links between changes in certain ES benefits and others identified in previous exercises (e.g., an increase in the number of floods may be related to an increase in the presence of waterborne diseases).

- b) Which of the effects listed do they consider to have the greatest impacts on their well-being? Why?
- c) To what extent have the causes identified increased or decreased (improved or worsened) in the last 2 decades? What about the effects?

Responses / Adaptations

- d) Have there been any initiatives from the community to improve any of these factors (either causes or effects)? What were the results? Why? (If none were organised, why?)
- e) Have there been any initiatives from the government, NGOs or other external agencies to improve any of these factors? What were the results?
- f) What causes of changes in ES / disservices do participants believe are beyond the community's capacity to resolve? Why?

Potential future responses

- g) What kind of community initiatives do participants believe could be organised to address the ES changes identified in the area?
 - h) What kind of interventions – by NGOs, international agencies, or the government – do participants believe could help to address some of the changes in ES or their negative effects? Why?
- 5. Review your findings with the participants. Ask them if they have any questions or additional comments.
 - 6. Copy diagrams and take pictures of them.

4.23. Exercise W: Matrix Scoring Exercise on ES Benefits

Why?

- To rank ES benefits according to their importance to address different social groups' needs.
- To identify intra-household differences in terms of access to and use of ES benefits.
- To identify temporal and spatial effects over ES (in)direct contributions to food security and livelihoods.

Who with?

- It is best to conduct this exercise with various combinations of informants that have different livelihood strategies and assume different domestic roles (i.e., groups according to socioeconomic condition and gender) as they may value ES differently.

What with?

- A spacious area / room.
- A flipchart, a board or the ground.
- Writing / drawing material of different colours.
- Seeds, coloured cards, or pebbles to signal scores.
- A camera to register the material produced.
- A digital recorder to record people's interventions.
- A notebook to take notes.

How?

1. Explain the purposes of the exercise to participants. In general, you will enquire about:
 - ☒ Which benefits obtained from local natural resources are the most important for residents' livelihoods?
 - ☒ Have there been any changes in residents' use and access to valuable ES?
2. Review the information collected from the focus group on ES (**Exercise 1**) with participants. Present the list of ES that were considered to have the greatest effects on local livelihoods, domestic activities and health. Ask them if they agree with those results. Take note of any additional key ES benefits mentioned.
3. Repeat the same procedure with the wild-foods recognised as the most important by local residents in **Exercise 1** (Trend analysis on wild-foods). Take note of any additional key wild-foods mentioned.
4. Considering the list of final ES and any others added in steps 2 and 3, ask participants to select those that they consider to be the most essential for their livelihoods (15 at most).
5. Proceed to carry out a matrix-scoring exercise following the same steps as in **Exercise 1** (group discussion on food):
 - Draw a matrix. Ask participants to place the final ES identified in the column headings, in order of importance for local livelihoods and well-being.
 - Discuss with participants what criteria they used to decide which ES was considered more essential than another. Make a list of all the criteria mentioned.
 - Record these criteria in the rows of the matrix (in order of importance).

- Make sure the criteria are phrased in a positive direction (i.e., greater scores indicate a more positive feature).
- Ask participants to work their way across each criterion and fill in the squares, giving each ES a score (from a fixed amount, e.g. 10 beans, seeds or pebbles) and explaining why.
- Review the scores with participants to confirm them.

Criteria	ES				
	Firewood (forest)	Crab (river)	Fish (lake)	Wild spinach (forest)
Contributes the most food or income for food	●●●●●●	●●●●●●	●●●●●●	●●
Easy to obtain / access	●●●●●●	●●●●●●	●●●●	●●●●●●
Little work required	●●●●●●	●●●●●●	●●●●	●●
Available all year	●●●●●●	●●●●●●	●●●●●●	●●●●●●	
....

Example. Scoring matrix exercise on ES

- Discuss the results with participants:
 - Do they consider that the importance of the ES listed, as shown in the table, is the same for all inhabitants of the community? How do they differ across local social groups (e.g., men, women, the elderly, the very poor, those living in specific areas of the village, etc.)?
 - Can all residents have equal access to these different ES or do some face difficulties or restrictions? Why?
 - Does the observed importance of ES, as shown in the table, change across seasons? How?
 - Are there any ES that were considered important in the past (e.g., 2 decades ago) that are no longer available? Why?
- Review your notes with participants. Ask participants if they have any questions or additional comments.
- Make a copy of the matrix and take pictures of it.

4.24. Exercise X: Venn Diagram and Group Discussion on Management and Governance of ES

Why?

- To describe land tenure arrangements at the community and household levels.
- To describe rights of access and ownership over local natural resources.
- To outline existing local community-based organisations that manage the local territory and natural resources.
- To assess the extent to which existing management structures are accountable, transparent and inclusive.
- To identify local and external stakeholders influencing local natural resource governance and to describe the relationship between them.
- To identify main forms of conflict and competition over accessing or controlling ES.
- To identify potential future responses to manage or reverse changes in ES that affect local livelihoods and food security.

Who with?

This exercise needs to be conducted for any natural resource which is managed separately in the village (e.g., if there is a forestry committee and a water distribution committee then the exercise needs to be repeated for forests and water). However, if resources are managed in an integral manner by the community, the exercise only needs to be carried out once.

For each natural resource discussion it is best to work with at least two separate groups of informants:

- A small group of key informants who are members of the resource management committee(s). This group would provide information on how they think resource governance is supposed to work.
 - A small group of key informants who are NOT members of the resource management committee(s). This group would provide inputs on how resource governance is perceived to work by those not involved at decision-making.
- ☞ Given the sensitive nature of topics to be discussed in this meeting, be careful when selecting participants. Rely on your knowledge of the area to make sure no individuals or groups in conflict are included and that no close relations of authorities are present.

What with?

- A large space or room that can guarantee confidentiality to focus group participants.
- A flipchart, a board or the ground.
- Writing / drawing material and cards of various colours.
- A camera to register the material produced.
- A digital recorder to record people's interventions.
- A notebook to take notes.

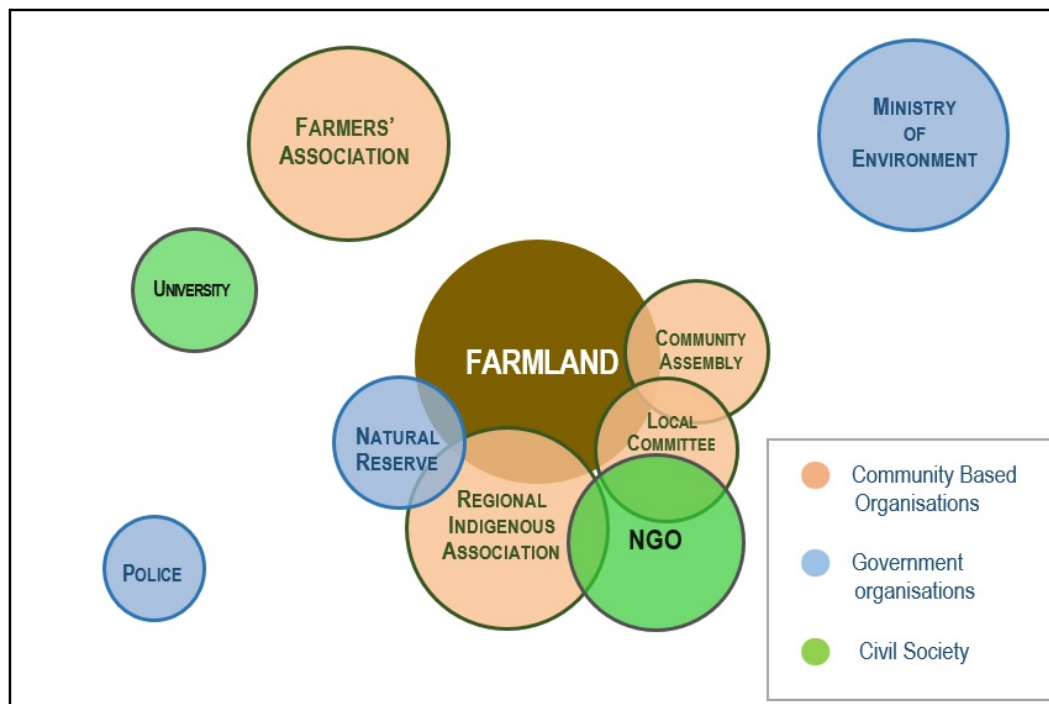
How?

1. Explain the purpose of the exercise to participants. In general, you will enquire about:

- ☑ What are the main organisations and institutions that manage existing local natural resources?
 - ☑ How do these organisations work and interact with each other?
 - ☑ How do individual residents gain access to the ES benefits managed by those organisations?
2. Conduct a VENN DIAGRAM exercise to facilitate the discussion. This exercise is useful to: (i) identify those actors that influence how natural resources are managed, (ii) to identify which social groups are included in the functioning of these organisations, and (iii) to identify how these organisations relate to each other:
- Select a large open space where the diagram can be drawn.
 - Ask participants to draw a big circle in the middle that represents the ES being analysed.
 - Ask participants to draw different sized circles to represent each institution, organisation, group or key person that has a say or influences how a given ES is managed. Use the following criteria to organise the circles being drawn:
 - Place circles near or far away from the central circle according to whether these actors have regular presence in the area where the ES is located or not.
 - Use different sizes to represent the importance or influence of the institution, organisation, group or person.
 - The contact between all actors is represented by the degree of overlap between circles:
 - Separated circles: No / very little contact or co-operation
 - Circles close to each other: Loose contact or co-operation
 - Touching circles: Some co-operation
 - Overlapping circles: Close co-operation
 - If you have coloured drawing materials, you may use them to group organisations according to their nature (e.g., community organisations in red, government organisations in blue, academic institutions in green, etc.).
3. Taking into consideration the most important community-based organisations managing the resource in question, as identified in the Venn diagram, discuss the following for each of them:

Formal decision making arrangements

- a) How are officers elected (or selected)?
- b) What is the relationship between these organisations and the relevant government departments? Are they officially recognised, etc.?
- c) How regularly do local committees meet? Who can call/attend meetings?
- d) How do these organisations make decisions (e.g., by voting or consensual agreement)?
- e) Do members of these community organisations work well together or are there differences among them? Why?
- f) Do all opinions and interests seem to be equally considered during the decision-making process? If not, which groups are usually favoured? Why?
- g) Are the decision-making processes in these organisations / committees transparent (i.e., do people know why and how a decision was taken)?
- h) How are decisions shared with the group? How do members submit topics for discussion?
- i) Is there any form of political interference? What about local elites? Do they influence the local organisations' / committees' decisions? How?



Example. Venn Diagram

Accountability

- a) How accountable are committees / organisations? Explore the following:
 - ☒ Democratic or political accountability (i.e., answering for following due process for decision-making and selection of officers)
 - ☒ Financial accountability (i.e., answering for management of group's resources).
 - ☒ Accountability for the performance of services (i.e., answering for the performance of the committee).
- b) To whom are they accountable?
- c) Is there legal recourse if the committees or an individual do not perform as they should? For example, how is abuse of funds dealt with?
- d) What is the mechanism for resolving disputes between members and committee officials? Is there any form of political interference from socioeconomic elites?
- e) Is there any evidence of debate and dialogue around resource management issues?
- f) Are committee members part of the local elite or 'average' residents of the community?
- g) Has there been any rotation of committee officer posts recently or do they always tend to be the same people?
- h) Do participants consider that committee officers are achieving their roles?

Stakeholders involved

- a) What persons or organisations are involved in the functioning of the local committees? To what extent?
- b) Are women / disadvantaged groups / ethnic minorities / immigrants actively included in the functioning of those groups?

- c) Who has the power to negotiate rights in each of these organisations / committees?
- d) What is the role of local people in selecting the form of management and allocation of rights?
- e) How were these organisations / committees formed? Which sectors from the community were involved?
- f) What is the role of local people in the management and planning of local natural resources (e.g., water, forest, communal farmland, etc.)?
- g) Is there specific consideration of the needs of the poorest (or of disadvantaged groups)?
- h) What is the knowledge of the management system amongst the general community?

Potential future scenarios

- a) Review with participants your findings about trends in land use and ES benefit changes over time (**Exercises 11 and 12**). Do they agree with them?
- b) How have the relevant local committees acted in the face of these changes? Have they promoted, attempted to control, or reversed them? Why?
- c) If these trends continue and the local committees do not act differently, what do participants think will happen to land use in the area and the condition of ES benefits?
- d) Do they believe that any local efforts could be developed through local committees to control or reverse the trends in land use and ES? If not, why?
- e) What circumstances do participants believe would convince local committees to act (more decisively) about these issues? Why?
- f) Do they believe that local committees or authorities are able to convince external actors – either NGOs or the government – to invest here to control or reverse these trends? Why?
- g) What kind of external interventions, from NGOs or the government would be preferable? Why?

☞ The topics of this FG are of a very sensitive nature. Make sure that participants are given all the guarantees necessary that all data will be kept confidential and their names will be modified in any report, article or dissemination material.

4.25. Exercise Y: Community Feedback Meeting

Why?

- To return the core research findings to the community and validate findings
- To discuss any future activities related to the research findings.

Who with?

It is recommended that this meeting includes the following community members:

- Chiefs and other formal community-level authorities.
 - Residents who took part in the different PRA exercises.
 - Representatives of various local associations relevant to natural resource management (water users associations, forestry committees, etc.).
 - Members of the community who do not hold a formal leading position in the community but are influential: elders, heads of large families, healers, shop-owners, etc.
- ☞ It is not necessary to have a detailed complete analysis of the PRA data in order to organise this meeting. The latter can be organised after preliminary results and outputs are produced to avoid making the population wait for too long for some feedback. Full detailed findings and reports can be handed over to local authorities much later.

What with?

- A large print out of key PRA outputs that residents requested during data collection.
- A large poster containing a summary of key findings for the village.
- Dissemination material containing a summary of findings for the community.
- Copies of any diagrams and maps produced during the PRA exercises

How?

1. Organise a large open meeting in coordination with local authorities. If open assemblies are not part of local custom, organise whatever meeting is considered appropriate. However, any dissemination material should be distributed across the entire community irrespectively of a resident's participation in the meeting or research.
2. Start by presenting, briefly, the nature of the research and its objectives. This will remind participants about what the project specifically intended to achieve.
3. Next, describe how the data-collection process took place. Describe the type of exercises produced, how participants were selected, the consent procedure followed as well as the compensation policy adopted. This will make transparent the inclusion criteria adopted and make explicit what kind of direct 'benefits' the project distributed among the population.
4. Before proceeding to present the research findings, ask participants if they have anything to add or comment on with regards to the procedure followed.
5. Present the research findings. The structure of the presentation may vary according to the interests of the population. However, it is recommended that the presentation includes the following key topics:

- a. Socioeconomic composition of the village:
 - Describe the socioeconomic groups identified in town.
 - Describe the socioeconomic composition of the village as perceived by residents.
 - b. Land Use:
 - Present the results of the PGIS map on land use, describing the main features of each land-use area identified.
 - Present the results of the trend analysis on land use, including visions of the future.
 - c. Food Security:
 - Present local definitions of food security and perceptions of resident's current food security conditions.
 - Present list of staple diets consumed by residents, identifying the main products they obtain from non-farm areas.
 - Present the results of the PGIS map on sources and flows of wild-foods.
 - Present the results of the trend analysis on wild-foods, identifying perceived key drivers of change.
 - d. ES for livelihoods:
 - Present list of final ES that residents identified as the most important for local livelihoods.
 - Present list of ecosystem disservices that residents identified that affect their well-being the most.
 - Present the results of the PGIS map on sources and flows of key final ES.
 - Present the results of the trend analysis on key ESs, identifying perceived key drivers of change.
 - e. Natural Resource Governance:
 - Present the list of community-based, civil society and government organisations that residents perceive as key stakeholders in the management of local resources.
 - Present a general assessment of which organisations in particular residents consider the most influential.
- ☞ Discussions on inter-organisational relationships may be a sensitive matter. Be careful in presenting a consolidated review of findings (mixing leaders' and non-leaders' versions) to avoid identifying informants. Secondly, avoid detailing reported conflicts; emphasise collaboration rather than competition or opposition.
6. Present a general brief review of how the village's trends fit into the regional-level findings for each of these topics. Do not focus on inter-village comparisons but on general commonalities or differences with overall trends. If comparisons are considered necessary, do not name specific villages to avoid any potential future competition.
 7. After each topic in the presentation, ask participants if they have any comments or observations.
 8. If considered important by the local population discuss how they may make use of the information returned. Make sure, however, that you do not raise any expectations about imminent forms of support from external actors.
 9. Provide the contact details for the local contact person who can provide more information after the meeting.

5. INFORMED CONSENT

5.1 Information Sheet: Key Informants

Use the form below (translated as appropriate) to inform key informants about the nature of the project and his/her rights as an informant. Be aware that this form is not a substitute for obtaining explicit consent from participants and key informants.

Project Information Sheet

Project Title: ASSETS (Attaining Sustainable Services from Ecosystems through Trade-off Scenarios)

Researcher: [Insert the names of the lead researcher supervising fieldwork]

Ethics number: [University of Southampton and local partner ethics committee numbers]

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

This research project aims to understand the links between food security and how people manage and use nature. Our research is funded by the UK government and is part of a bigger study working in Malawi, Peru and Colombia. It includes other partners from the UK, the US, South Africa and Spain. We would like to understand more about food security and health and nutrition in this area – e.g., how do people define food security, where do different people obtain food from normally and during difficult periods, how has this changed over time? We also want to understand how people use nature – e.g., what benefits (or costs) do different people derive from nature, how are natural resources managed, how has this changed over time?

Why have I been chosen?

We would like to talk to you because you have specialist knowledge in a topic of interest to the project.

What will happen to me if I take part?

We would like to have an interview with you of no more than [Insert length of interview]. If you agree, we might come back at some point in the future to ask for clarifications or additional information.

Are there any benefits in my taking part?

We will provide feedback on the results of the research to participants. We hope that some of our research may help participants take more informed decisions. [Insert information about any other form of compensation adopted by the project].

Are there any risks involved?

We don't envisage any risks to your participation. We will ask questions about livelihood strategies. If you are at all uncomfortable with any of these questions, you are free to skip any question or to stop the interview at any time.

Will my participation be confidential?

We will keep all the information you give us confidential as far as the law allows. Any notes or recordings we make will be kept on a password-protected computer. We will only share your personal details or personal views with researchers in the project. Some of the information you give us may be published, but your real name will not be used in relation to any of the information you have provided us, unless you tell us clearly that you want us to use your real name. You should know that even though we will avoid including identifying information in any publication, there is still a possibility that people will recognise you by the things you say. If at any time you feel concerned about what you are saying being disclosed, please feel free to stop and talk to us about it. If you say something that you later think should be deleted from our discussion notes, just let us know.

What happens if I change my mind?

You can stop this interview at any time, without giving a reason.

What happens if something goes wrong?

If you have any concerns about this research, you can contact... [Insert the contact details of the Principal Investigator for the local country partner]

Where can I get more information?

If you would like more information about this research, you can contact... [Insert contact details of local researcher coordinating fieldwork].

5.2 Consent form: Key Informants

The form below is to be used AFTER the key informant has read the project information sheet provided in section 5.1. It is expected that they will sign the form attached. If for any reason this is not possible, you can ask for a recorded verbal consent in the presence of another team member.

Consent Form: Key Informants

Project Title: ASSETS (Attaining Sustainable Services from Ecosystems through Trade-off Scenarios)

Researcher: [Insert the names of the lead researcher supervising fieldwork]

Ethics number: [University of Southampton and local partner ethics committee numbers]

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet provided and have had the opportunity to ask questions about the study.

☐

I agree to take part in this research project and agree that my data may be used for the purpose of this study

☐

I agree that my participation in this study may be tape-recorded

☐

I agree that photographs may be taken of my participation in this study

☐

I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected

☐

I understand that my real name will NOT be used in any publications (paper-based and electronic) resulting from this study

☐

I understand that information collected about me will be stored on a password protected computer and that this information will only be used for the purpose of this study.

☐

Would you like your real name to be used in the publications resulting from this study?

Yes	No
-----	----

Name of participant (print name).....

Signature of participant.....

Date.....

5.3 Consent Form: Group discussion participants

This form will only be used for group discussions. Before the exercise takes place you must read the content of the form to all participants. Make sure that everybody has understood the content of the form before proceeding. If any participant does not want to sign the form, you can give them the option of providing an oral consent. The latter should be recorded and granted in front of another research team member.

If you are working with a native population, you must prepare a translation in advance and make sure that the same version is used by all team members. The translation should be reviewed by a local resident prior to data-collection.

Consent Form: PRA Informants

Introduction to the Research

Our names are [Insert the names of the team members leading exercise]

We are from [Insert the name of the project and local partners]

We are undertaking research into the links between food security and how people manage and use nature. Our research in this community is part of a bigger study working at several sites in Malawi, Peru and Colombia and including other partners from the UK, the US, South Africa and Spain. We would like to understand more about food security and health and nutrition in this area – e.g. how do people define food security, where do different people obtain food from normally and during difficult periods, how has this changed over time? We also want to understand how people use nature – e.g. what benefits (or costs) do different people derive from nature, how are natural resources managed, how has this changed over time? To start the research we are doing a number of exercises with different groups of people to get a general understanding of these issues in this community. We will organise a feedback session to present the information back to the community. We will then continue with further research with individual households.

In this exercise [insert name], we are interested in finding out more about.....

We have asked you to participate because..... [insert reason, e.g. village elders, men, women, particular livelihood or natural resource user group].

The exercise will take about 2 hours but you are free to leave at any time. Before we start we want to make sure that you understand the research we are doing and what we will do with the information we collect.

Oral Consent Script

1. We have given you some information about this research. Did we make things clear? Do you want to ask us any questions about the study?
2. We will keep all the information you give us confidential as far as the law allows. Any notes or recordings we make will be kept on a password-protected computer. We will not share your personal details or personal views with anyone else. Are you ok with this?
3. Some of the information you give us may be published but your real name will not be used, unless you tell us clearly that you want us to use your real name. Is that ok with you?

4. You should know that even though we will avoid including identifying information in any publication, there is still a possibility that people may recognise you by the things you say. If at any time you feel concerned about what you are saying being disclosed, please feel free to stop and talk to us about it. If you say something that you later think should be deleted from our discussion notes, just let us know. Is that clear?
5. If you mention anything you do not want us to publish, please say so and we will follow your request.
6. Be aware that you can stop this discussion at any time, without giving us any reason. Is that ok?
7. We would like to record this discussion with a digital audio recorder. That way we can listen to the recording afterwards and catch things you say that we might not fully understand during the discussion, or might otherwise forget. Only people in our study team will be able to listen to the recording. Do you give us permission to record?
8. If you agree, we would like to take some photos. We might use these in presentations or publications about this project. Do you agree?
9. Do you have any further questions before we start with the exercise?

Village:

Date:

Exercise:

Team member's names

Signature

.....

.....

Participants' name(s):

Signature

.....

.....

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5.4 Project's Compensation Policy

This policy concerns how we compensate local participants who contribute their time and knowledge to the project. This policy outlines the underlying principles which apply across the whole project. Local project partners will adapt these to align them with national and local norms in the project's research areas.

Underlying principles

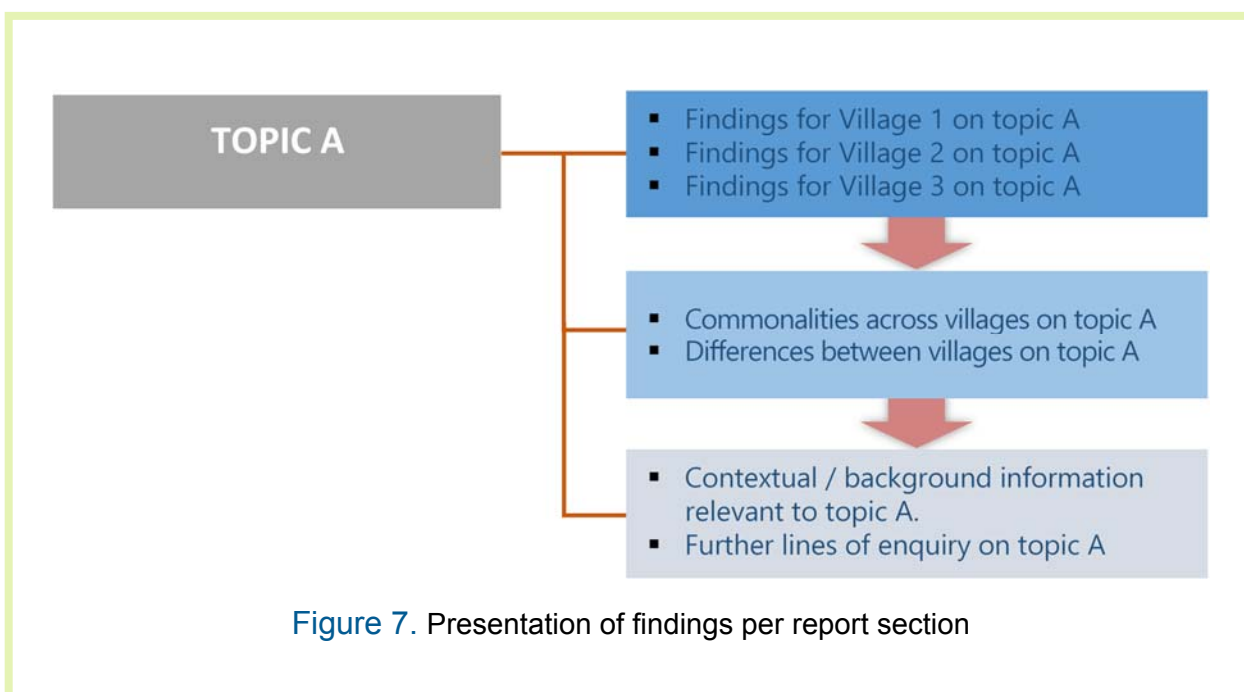
1. A fair and transparent compensation policy applied consistently by all researchers in the project is important to maintain a productive and mutually respectful relationship with local research participants.
2. Compensation should be in line with national and local norms and not undermine the willingness of people to participate in future research projects. In general, compensation should be seen as a 'thank you' gesture rather than compensation directly proportional to time spent.
3. Where possible, research activities involving community members will be organised at a place and time that is convenient to the participants.
4. For activities that require participants to travel from their usual places of residence / work, the project will either organise transport or compensate the cost of the transport.
5. In general there will be no compensation for small, one-off activities. However, for community or group level meetings that are longer than two hours duration, light refreshments will be provided. A meal should be provided for meetings that span more than four hours.
6. For prolonged and multiple interactions between researchers and the community (e.g. PRA with different groups in a community), compensation will usually be targeted at community level benefits. Where possible, compensation will be in kind rather than monetary. Examples might include (i) networking community agencies with external service providers; (ii) development and sharing of educational materials; (iii) community days or fairs in which the project helps arrange and sponsor an event which most community members would enjoy (e.g. a sports tournament, a dance festival, a food fair); (iv) provision of infrastructure (e.g. development of a community garden at the school or clinic, a footbridge over a difficult stream); (v) maintenance of neglected community infrastructure (e.g. painting of the community hall).
7. For households visited repeatedly (e.g. for the household surveys), it may be appropriate to provide a thank you 'gift'. This should generally be offered towards the end of the project or specific research activity to limit or avoid any respondents changing their responses in an attempt to ensure or increase the flow of benefits. Examples might include: common food items (tea, sugar, maize meal, dried beans), or stationery for school children and the household, child growth charts, tree seedlings, cell phone airtime vouchers.
8. Where individuals are employed by the project to provide research services (e.g. translation at meetings, guiding in the forest or help with ecosystem service assessments), they should be compensated according to the local day-wage practices.
9. Key informants interviewed in their official capacity (extension officers, local government officials) will generally not be compensated for their time, though transport expenses (if appropriate) and light refreshments may be provided.

6. REPORTING

A critical step in using PRA exercises in a research process is to make the information from all study sites and countries available in a consistent form to other team members. This section presents the suggested structure of a final report (Fig. 7) to consolidate the information obtained from all the exercises described in previous sections. This report outline identifies the key exercises that feed information into a respective chapter / section as well as the key topics that need to be covered.

Authors should be aware that each item within the proposed structure needs to be further developed as follows:

- i. Each section should first present the data referring to each village studied.
- ii. Next, authors need to consolidate the village-level information into a regional-level description of the topic in question. This should highlight the commonalities found across all sites as well as any key differences identified with relation to a given topic.
- iii. Finally, each topic should include relevant contextual information to provide a potential explanation for overall findings or additional complementary information. This is the only section where you can include information from secondary sources (e.g., literature reviews, government reports, etc.). In addition, this section should highlight any findings that require further investigation by the research team.



6.1. Introduction

This section intends to provide background information to the reader in terms of the geographical location, infrastructure, landscape features, and general history of the village.

a) Sources:

- Exercise G: Participatory land use mapping
- Exercise I: PGIS map
- Exercise J: Transect Walk
- Exercise R: Food security timeline
- Exercise E: Well-being ranking

b) Structure:

- 1.1. Community's history: A brief narrative of the historical trajectories of the villages visited describing key dates, changes in borders, forms of government, appearance of public services and overall historical periods as identified by local people.
- 1.2. Location: GPS coordinates per village.
- 1.3. Local landscape: A general description of boundaries and key geographical features (topography, wildlife, types of forest areas, etc.) of each village.
- 1.4. Public services and infrastructure: A description of public services available in each village and details on local infrastructure investments (public and private).
- 1.5. Population: Report the number of households identified per location and the key demographic characteristics of the heads of household (age, sex, and marital status).

c) Figures:

- Participatory land-use maps or PGIS maps (Section 1.3).

6.2. Livelihoods and Well-being

This chapter intends to provide an overall depiction of local socio-economic conditions. To achieve this objective, it will provide local definitions of wealth and well-being to present this topic using local terms. These definitions will lead to the establishment of key material and nonmaterial indicators of well-being that will serve to classify residents into socio-economic groups. Once the latter have been defined, associated livelihood strategies will be described. This, in turn, will serve to identify, first, which ES are the most relevant to local livelihoods and well-being and, second, to assess their relative importance to different sectors of the community.

a) Sources:

- Exercise D: Group discussion on well-being and livelihoods
- Exercise E: Well-being ranking
- Exercise F: Household System Diagram
- Exercise H: Land use discussion [complementary source]

b) Structure:

2.1. Well-being: local definitions and socio-economic composition

- a. An outline of local understandings of 'well-being', 'wealth' and 'poverty' reported by residents.

- b. A list of economic and non-economic indicators used locally to distinguish between socio-economic groups and an explanation of the rationale.
- c. A description of the socio-economic composition of the study areas: (quantitative classification of households in different well-being groups).
- d. An outline of key changes in local living conditions and inequality issues in the recent past.
- e. An outline of key factors driving the main changes in local living conditions in the recent past (according to whether they originated in the community or responded to external factors).

2.2. Livelihood strategies:

- a. A description of local livelihood strategies (farm and non-farm activities) according to households' socio-economic condition.
- b. A description of seasonal variations in livelihood strategies and productive practices.
- c. A description of any significant historical changes (inter-annual) in local livelihood strategies.
- d. An outline of key causes leading to inter-annual changes in local livelihoods (according to whether they originated in the community or responded to external factors).

2.3. ES contributions to livelihoods and well-being:

- a. A brief (general) outline of the main (in)direct contributions of ES to livelihoods, food security and quotidian activities.
- b. An outline of within-household distribution of domestic and economic roles as well as use of ES benefits.
- c. An outline of geographical and seasonal factors affecting the contributions of ES to local livelihood strategies and productive practices.
- d. General depiction of the most recurrent local struggles over access and management of ES relevant to local livelihoods and forms of negotiation.
- e. A general assessment of the effectiveness of livelihood strategies and use of natural resources in order to attain adequate levels of material well-being and food security.
- f. A list of the prices obtained for local produce and commercialisation of ES benefits or derived products.

c) **Figures:**

- A pie-chart consolidating the socio-economic composition of ALL villages (Section 2.1)
- Reproduce the most illustrative household system diagrams (Section 2.2)

6.3. Land Use

This chapter will discuss the overall features of the landscape that were observed across the study area; providing a rich description of the main ecological and topographic features of each type of forest, farmland, water sources, etc., as identified by local informants. Next, the chapter should introduce the reader to the forms of access, ownership and management that are predominant in the area making sure to highlight any substantial differences across different social groups, either because of socio-economic (e.g., gender, ethnicity, etc.) or spatial considerations (i.e., location of dwelling). The chapter will close by identifying key changes in local forms of land-use and their impacts over the local population.

a) Main sources:

- Exercise G: Participatory Land Use mapping
- Exercise H: Land Use discussion
- Exercise J: Transect Walks
- Exercise K: Trend Analysis on Land Use
- Exercise I: Participatory GIS [complementary source]
- Exercise F: Household System Diagram [complementary source]

b) Structure:

3.1 Main forms of land-use:

- a. A generic classification of main forms of land use observed in the study areas.
- b. A rich description of each land use area in terms of natural resources (e.g., vegetation, animals, soil type, etc.) and main uses by local households (productive and non-productive).

3.2 Land tenure and rights over ES:

- a. A description of (formal and informal) land tenure arrangements, including any gender-based differences.
- b. A description of rights of access and forms of ownership over natural resources (e.g., forest areas, catchment areas along rivers, etc.).
- c. A description of current challenges and threats to access and use of ES benefits and land (according to whether they originated in the community or responded to external factors).
- d. A description of existing mechanisms of negotiation and enforcement of rights.

3.3 Land exploitation systems:

- a. Description of current uses of land exploitation systems in the study areas:
 - List of main crops and derived products generated.
 - Depiction of main inputs used.
 - Description of crop / forestry / land management strategies.
 - Description of main limitations (financial, technical, labour, land fertility issues, etc.)
- b. Description of any reported (in)direct contributions of ES to livelihoods by means of trading ES-derived products.

3.4 Trends in land use:

- c. A description of key changes over time in land use.
- d. An outline of perceived effects of changes in land use on the provision of ES, particularly those essential to local livelihoods and food security.
- e. An outline of key drivers (direct and indirect) leading to changes in land use. Distinguish between those originating in the community and those responding to external factors.

c) Figures:

- Reproduce pictures obtained through transect walks to illustrate descriptions of key land-use areas (Section 3.1)
- Reproduce the Trend analysis matrices generated (Section 3.4).

6.4. Seasonal calendars

This chapter will provide a rich description of seasonal variations in livelihoods, food security and economic well-being across the villages studied. Each section should provide a brief depiction of driving factors leading to seasonal changes.

a) Sources:

- Exercise L: Seasonal Calendar
- Exercise D: Well-being discussion
- Exercise F: Household System Diagram [complementary source]
- Exercise M: Group Discussion on Food [complementary source]

b) Structure

- 4.1 Seasons: A description of the main seasons identified in the area. Detail which months are covered and describe key climatological features.
- 4.2 Agricultural calendar: Detail periods of planting, harvesting and any other crop-management activities (e.g., burning) for each key crop identified. Distinguish the description for perennial and annual crops.
- 4.3 Hunting and fishing calendars: Detail periods when hunting and fishing are more prevalent and periods when those activities are not conducted. If important, distinguish between the types of animals and fishes that have different calendars.
- 4.4 Other income-generation activities: Detail periods of activity in which other income-generation activities are performed. Include any common household business activities and sales of by-products from farm and non-farm areas (e.g., handicrafts).
- 4.5 Income and expenditure: A description of seasonal variation in households' income and expenditure. Make sure to describe the key factors driving peak periods in income and expenditure as well as those moments when income to cover average household expenditure is very limited.
- 4.6 Access to food: Provide a description of periods of food scarcity faced by the local population (if any).
- 4.7 Health issues: Describe the main seasonal health problems faced by the local population and the key factors driving their emergence (e.g., the seasonal reduction in river water levels leave stagnant water, this attracts mosquitoes and makes malaria more common).

c) Figures:

- Reproduce the seasonal calendars generated. You may divide them according to theme (a calendar on crops and economic activities and another on food and health issues).

6.5. Food Security

This chapter aims to provide a detailed description of current food security conditions in the study sites, as perceived by residents, as well as of changes on this subject over time and subsequent impacts on local well-being. Emphasis will be placed on the ES contributions to

local diets by means of wild-food provision (e.g., bush-meat) during normal times and periods of scarcity.

a) Sources:

- Exercise M: Group Discussion on Food
- Exercise P: Group Discussion on Food Security
- Exercise R: Food Security Timeline
- Exercise F: Household System Diagram [complementary source]
- Exercise O: Participatory Mapping of wild-foods [complementary source]

b) Structure

5.1 Food basket and ES contributions:

- a. A consolidated list of food products consumed in the study areas. This list will include the following:
 - Food purchased, home-grown, as well as hunted / collected / fished.
 - Identification of the key food items that are part of most common regular diets.
 - Identification of main sources for each food item that features regularly in local diets.
- b. A ranking of local food sources and explanation of rationale for classification.
- c. A description of seasonal variations in local diets and reliance on wild-foods.
- d. A description of any spatial effects on access to wild-foods.
- e. A description of any differences in access or use of wild-foods across local social groups.

5.2 Food Security

- a. An outline of local definitions of ‘food security’ and relevant indicators at the household and community levels.
- b. An outline of local definitions of food insecurity and scarcity / hunger (household and community levels).
- c. A detailed discussion on the local features of the following dimensions of food security:
 - Availability
 - Affordability
 - Access
 - Health and Quality
- d. A description of within-household differences in terms of food security.

5.3 Changes and trends in food security:

- a. An outline of key changes over time in terms of availability of:
 - Wild-foods
 - Food sources
- b. A depiction of perceived changes over time in terms of overall food security.
- c. A description of perceived effects of changes in land use on ES (in)direct provision of food.
- d. A description of key factors identified as driving these historical changes (according to whether they originated in the community or from external sources).
- e. A description of the main initiatives / forms of intervention conducted in the area to address food security issues and their final outcome (according to whether they are local initiatives or external).

c) Figures:

- Reproduce the most illustrative PGIS maps on wild-foods (Section 5.1).
- Reproduce the most illustrative scoring matrices on food sources (Section 5.1).
- Reproduce the most illustrative trend analyses on wild-foods (Section 5.3).
- Reproduce the most illustrative cause-effect diagrams on changes in wild-food stocks (Section 5.3).

6.6. Coping Strategies

The chapter will close with a section on the coping strategies that residents adopt in order to deal with food scarcity, sorted according to severity. Each of these coping strategies will be described in detail, including information on their dependence on ES.

a) Sources:

- Exercise P: Group Discussion on Food Security
- Exercise Q Food Insecurity Cause-Effect Diagram
- Exercise R: Community Timeline on Food Security
- Exercise S: Group Discussion on Coping Strategies

b) Structure:

6.1 Coping Strategies:

- a. A description of all coping strategies used locally to deal with food scarcity (grouped according to similarity). This description should include :
 - Type of activities conducted by the household
 - Main conditions for their implementation
 - Factors leading to the adoption of a given coping strategy
 - Effectiveness: time that people can cope and presence of any negative consequences.
- b. Ranking of coping strategies according to their severity and explanation of rationale to differentiate between levels of severity.
- c. An outline of spatial and social factors affecting households' capacity to adopt coping strategies.
- d. A description of historical changes in local coping strategies.
- e. An outline of the main factors (internal and external) affecting changes in the adoption of coping strategies over time.

6.2 ES contributions to Coping Strategies:

- a. A list of wild products used in times of food scarcity and their main sources in the local landscape.
- b. An outline of the main environmental or geographical considerations limiting households' capacity to access sources of wild-foods used for coping strategies.
- c. An outline of social, economic, or cultural considerations limiting households' capacity to access sources of wild-foods used for coping strategies.

6.7. Ecosystem Services for Livelihoods

This chapter will provide a detailed description of all ES contributions to local well-being other than those related to wild-foods for self-consumption. All ES that are used for productive and

income-generating activities as well as those that contribute to daily basic needs (aside from food) will be identified. The rankings of different ES by local informants according to their relative importance for domestic roles will be presented. In addition, this chapter will describe any changes in ES stocks, as perceived by residents, their associated drivers and pressures, their effects on residents' well-being and local forms of adaptation/response.

a) Sources:

- Exercise T: Group Discussion on ES benefits and disservices
- Exercise U: Participatory Mapping of ES benefits and disservices
- Exercise V: Cause-Effect Diagram on Changes in ES
- Exercise W: Matrix Scoring Exercise on ES benefits
- Exercise F: Household System Diagram [secondary source]
- Exercise J: Transect Walks [secondary source]

b) Structure:

7.1 ES non-food contributions:

- a. A list of (in)direct contributions of ES benefits to local livelihoods, identifying source areas and times of the year in which they are most consumed. Sort it according to type of use:
 - Agriculture and Livestock rearing
 - Other income-generation activities (including by-products)
 - Medicinal plants
 - Daily activities / cultural
- b. A list of any negative effects from nature, identifying areas in the landscape from where they appear and times of the year in which they are most commonly present.

7.2 Ranking of ES benefits:

- a. A general ranking of ES benefits identified by local residents and explanation of rationale.
- b. An outline of perceived differences in the importance of ES benefits over time.
- c. An outline of perceived differences in the importance of ES across local social groups
- d. An outline of perceived differences in the importance of ES benefits for different household members.

7.3 Key changes and drivers of change

- a. An outline of the current condition and trends in the supply and demand of ES benefits and negative effects from nature.
- b. A description of the perceived effects of trends in ES benefits on livelihoods and food security.
- c. A description of the direct and indirect drivers that affect ES provision, according to whether they originated in the community or responded to external factors.
- d. A description of previous initiatives to manage or redress perceived changes in ES benefits and negative effects, either from the community or from external actors.

c) Figures:

- Reproduce the most illustrative PGIS maps on ES sources (Section 7.1).

- Reproduce the most illustrative scoring matrices for non-food ES (Section 7.2).
- Reproduce the most illustrative trend analysis matrices for changes in ES (Section 7.3).
- Reproduce the most illustrative cause-effect diagrams on changes in non-food ES (Section 7.3).

6.8. Natural resource governance

This chapter will provide a comprehensive description of the organisational structures and normative frameworks that regulate local access to and ownership of different groups of ES. It is recommended that this chapter is thematically divided according to the key sectors that are regulated in the study area. If resources are managed by different organisational / normative structures, then you will need as many sections as sectors observed (e.g., one on agriculture and another on forest management).

a) Sources:

- Exercise X: Venn diagram and FG on Natural Resource Governance
- Exercise D: Well-being discussion [secondary source]
- Exercise H: Land Use discussion [secondary source]
- Exercise P: Group Discussion on Food Security [secondary source]

b) Structure:

8.1 Rights:

- a. Summary of households' and individual land tenure rights.
- b. Summary of households' and individual rights to access and ownership of ES benefits.
- c. Summary of any limitations or restrictions to certain social groups in terms of ownership or access to key ES benefits.

8.2 Organisational landscape:

- a. Description of community-based organisations for local management of territory / natural resources.
- b. Description of influential governmental organisations shaping local management of territory / natural resources
- c. Description of civil-society organisations influencing local management of territory / natural resources.
- d. General depiction of relationship / effects between listed organisations and general impact on the current state of local ecosystems / natural resources.

8.3 Operational structures and features of key local organisations:

- a. Formal mechanisms of decision-making
 - Instances
 - Meetings
 - Cohesion / participation
 - Transparency
- b. Accountability
 - Responsibilities and obligations
 - Supervision
 - Rotation of authorities

- c. Stakeholders
 - Key stakeholders
 - Information / participation of population
 - Interests and objectives
 - Conflicts and negotiations

c) Figures:

- Reproduce the most illustrative Venn-diagrams about key ES governance (Section 8.2).

6.9. Potential Scenarios

This chapter will provide a rich depiction of residents' visions of the future in terms of well-being and access to ES under current trends in land use, stocks of wild-foods, and other ES key to local livelihoods. In face of these potential scenarios, the final section will present potential future initiatives for managing or reversing trends in the loss or degradation of key ES. Potential interventions include those relying on community organisation / mobilisation and those depending on external support.

a) Sources:

- Exercise X: Venn diagram and Focus Group on Natural Resource Governance
- Exercise K: Trend analysis on land use
- Exercise M: Group discussion on Food [complementary source]
- Exercise T: Group Discussion and trend analysis on ES [complementary source]
- Exercise V: Cause-Effect diagram on changes in ES [complementary source]

b) Sources:

9.1 Visions of the future

- a. Description of visions of the future (10 years) for land use and rationale.
- b. Description of visions of the future (10 years) for provision of wild-foods and rationale.
- c. Description of visions of the future (10 years) for availability of ES benefits and recurrence of negative effects from nature and rationale.

9.2 Scenarios and future responses:

- a. Overall depictions of the future at the community level and rationale used in terms of key changes observed in ES.
- b. A description of the main responses and forms of adaptation currently implemented by local communities (according to whether they are local initiatives or the result of external interventions).
- c. A description of potential future responses from organised communities and forms of support required.
- d. An outline of potential external interventions that the communities need to address / redress the reported changes in ES.

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